(2)

United States Army
Recruiting Command

USAREC SR 87-4

ALLOCATION OF THE ARMY'S MONETARY AND NON-MONETARY INCENTIVES:

SENSITIVITY TO GOALS, ESTIMATION TECHNIQUE, DELINKAGE POLICY AND ACF ACTUARIAL COST ASSUMPTIONS

BY
RICHARD C. MOREY
AND
C.A. KNOX LOVELL

SEPTEMBER 1987

Approved for Public Release;
Distribution Unlimited

Research and Studies Division
Program Analysis and Evaluation Directorate
Fort Sheridan, Illinois 60037

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

ADA263207

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION: Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY: N/A	3. DISTRIBUTION/AVAILABILITY OF REPORT: ~~May not be released by other than sponsoring organization without approval of U.S. Army Research Office~~
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE: N/A	
4. PERFORMING ORGANIZATION REPORT NUMBER(S): Delivery Order 0422	5. MONITORING ORGANIZATION REPORT NUMBER(S): TCN 87-141
6a. NAME OF PERFORMING ORGANIZATION: C.A.K. Lovell Consulting, Inc; 6b. OFFICE SYMBOL (If applicable): C.A.Knox Lovell	7a. NAME OF MONITORING ORGANIZATION: U.S. Army Recruiting Command ~~REsearch Office~~
6c. ADDRESS (City, State, and ZIP Code): 4403 Beechnut Lane, Durham, NC 27707	7b. ADDRESS (City, State, and ZIP Code): ~~200 Park Drive, P O Box 12297 Research Triangle Park, NC 27709~~ USARCPAE-RS Fort Sheridan, IL 60037
8a. NAME OF FUNDING/SPONSORING ORGANIZATION: U S Recruiting Command; 8b. OFFICE SYMBOL (If applicable): USARCPAE-RS	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER: Contract DAAL 03-86-D-0001 Delivery Order 0422
8c. ADDRESS (City, State, and ZIP Code): Dr. Robert Wegner, US Army Recruiting Command USARCPAE-RS, Fort Sheridan, IL 60037	10. SOURCE OF FUNDING NUMBERS: PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
Allocation of the Army's Monetary and Non-Monetary Incentives: Sensitivity to Goals, Estimation Technique, Delinkage Policy and ACF Actuarial Cost Assumptions

12. PERSONAL AUTHOR(S)
Richard C. Morey and C.A. Knox Lovell

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM 5/87 TO 9/87	1987 September 18	152

16. SUPPLEMENTARY NOTATION Task was performed under a Scientific Services Agreement issued by Battelle, Research Triangle Park Office, 200 Park Drive, P.O. Box 12297, Research Triangle ~~Park, NC 27709~~

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Recruiting, manpower, enlistment incentives, Army College Fund, bonuses, military occupational specialties, translog models, seemingly unrelated regression.

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

In this study the sensitivity and robustness of the Enriched Enlistment Incentive Cost Allocation Model is examined in several respects. (1) The model is used to investigate the effects of delinkage of ACF and EB options and the effect of guidance counselor reform. Results based on CY86 data confirm earlier cost-saving findings based on FY81-FY86 data. (2) The model is exercised using active duty man-years rather than contracts as the manpower measure. The model suggests a somewhat different optimal mix of the ACF and EB options. (3) The model is exercised using lower actuarial prices for the ACF option than those previously used. Results are as expected; the ACF option becomes more cost-effective. (4) The model is re-estimated for each MOS separately rather than for 21 MOS's simultaneously. Loss in accuracy is very small, making use of the model on a personal computer feasible, thereby expanding the number of MOS's that can be examined. A program was installed at USAREC for this purpose.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION: Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL: Dr. Robert Wegner	22b. TELEPHONE (Include Area Code): (312) 926-7184; 22c. OFFICE SYMBOL: USARCPAE-RS

DD Form 1473, JUN 86 — Previous editions are obsolete. — SECURITY CLASSIFICATION OF THIS PAGE

Unclassified

ALLOCATION OF THE ARMY'S MONETARY AND NON-MONETARY INCENTIVES: SENSITIVITY TO GOALS, ESTIMATION TECHNIQUE, "DELINKAGE" POLICY, AND ACF ACTUARIAL COST ASSUMPTIONS

by

Richard C. Morey and C.A. Knox Lovell

September, 1987

USAREC STUDY REPORT 87-4

Approved for public release; distribution unlimited

Final Report of study contracted through Battelle Columbus Division
under contract DAAL03-86-D-0001, Delivery Order 0422,
Army Research Organization Scientific Services Program

Research and Studies Division
Program Analysis and Evaluation Division
U.S. Army Recruiting Command
Fort Sheridan, Illinois 60037

DISCLAIMER

The views and/or findings contained in this report are those of the authors and should not be construed as an official Department of the Army policy position or decision, unless so designated by other documentation.

Table of Contents

The information in Block No. 3 of the DD Form 1473 should be deleted. This report is for public release.
Per Dr. Robert Wegner, US Army Recruiting Command

FIGURE

TABLES

Page No.

1.0 INTRODUCTION

1.1 Context of Present Effort

This is the final report of a 3-month study that extended from May 1987 until mid-September 1987. It concludes the last of four efforts[1] to improve the allocation of monetary and nonmonetary enlistment incentives used by the U.S. Army to attract quality[2] recruits.

During this project several analytical models for the allocation of enlistment incentives were developed, refined, exercised, and validated with considerable data support from USAREC; a working computerized program was installed at USAREC's headquarters at Fort Sheridan, Illinois. Figure 1 presents an overview of the use of the approach, at the MOS level. To appreciate the magnitude of the problem involved, about $1.17 billion have been spent over 23 quarters (from FY81 through June 1986) for enlistment bonuses (EBs) and Army College Fund (ACF) expenditures, using DOD's actuarial cost estimates for the ACF benefit.[3] Over this period of time, 351,476 net GSA recruits were obtained at an average cost of $3,340 per recruit in

---

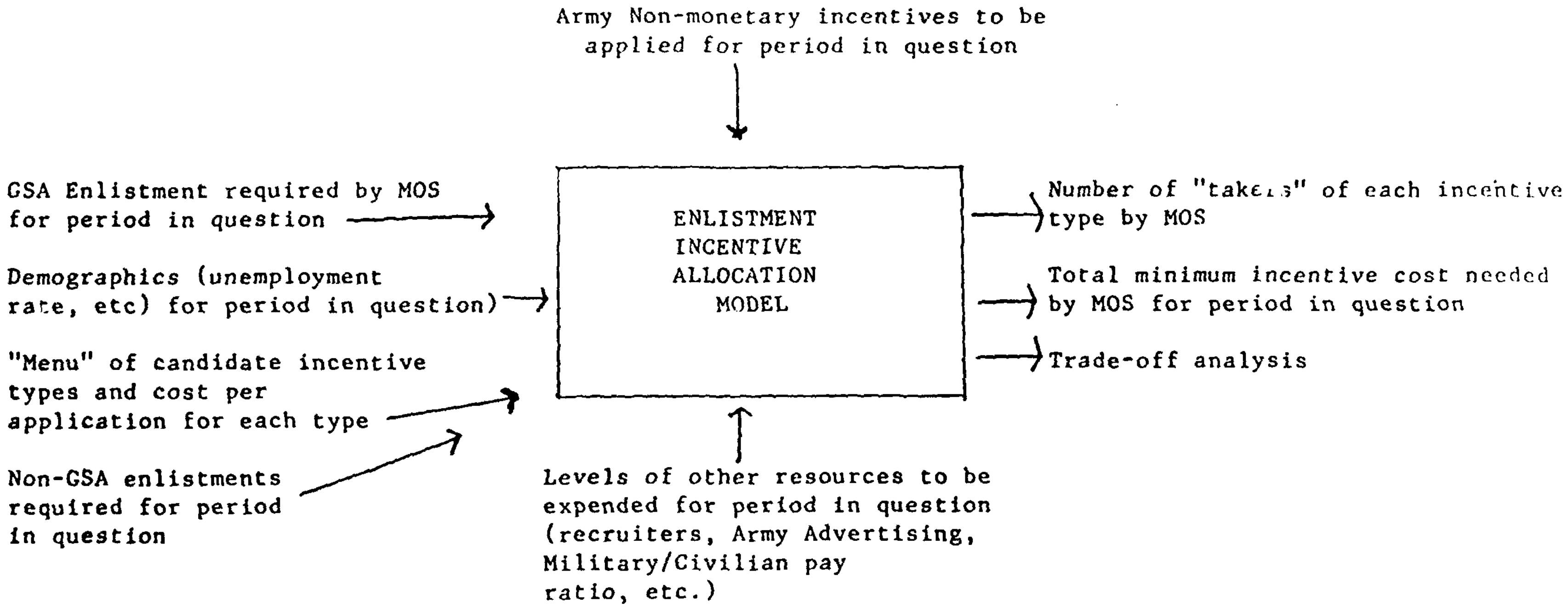
1. For reports covering the three previous efforts, see (1) Morey, Richard C., and Lovell, C.A. Knox, "The Optimal Allocation of the Army's Enlistment Incentives: Factors, Problem Definition and Formulation," Delivery Order No. 1618, Contract DAAG 29-81-D-0100, begun in May 1985, and concluded in August 1985; (2) Morey, Richard C., and Lovell, C.A. Knox, "A Prototype Model for Allocating Army Enlistment Incentives: A Feasibility Phase," USAREC SR86-3, begun in September 1985 and concluded in February 1986; and (3) Morey, Richard C., and Lovell, C.A. Knox, "Improving the Allocation of Monetary and Nonmonetary Enlistment Incentives for the U.S. Army: Analysis of FY81-FY86 Experience," Delivery Order 2476, Contract DAAG 29-81-D-0100, begun July in 1986 and concluded in February 1987.

2. "Quality" refers to the Army's designation of a GSA recruit who has a high school degree diploma and who scores above the 50th percentile on the Armed Forces Entrance exam.

3. That is, $2,659 for the 2-year ACF, $3,326 for the 3-year ACF, and $3,329 for the 4-year ACF.

FIGURE 1

INPUTS AND OUTPUTS FOR THE CONTEMPLATED ENLISTMENT INCENTIVE ALLOCATION MODEL



incentive expenditures. Fully 65% of the GSA recruits received some monetary incentive over this period.[4]

1.2 Key Thrusts of Present Effort

This effort is distinguished from the three earlier ones in that its key thrust is the basic robustness and general sensitivity of the allocation recommendations, using the previously developed general approach. Having been fully critiqued and exercised on both cluster-level and MOS level data, the basic approach has acquired a considerable amount of credibility and appeal. What is desired at this point is to determine how variations in the general approach will affect the allocation recommendation that has been generated. Changes in goals, the detailed estimation technique employed, the time periods analyzed, and the ACF actuarial cost estimates used are the key issues to be investigated in this effort. More specifically, each of the following sensitivity issues is considered:

A. Optimal Allocations Under "Delinkage" and Guidance Counselor Reforms

In the middle of December 1985, the Army was no longer permitted to award both the ACF and an EB to a recruit. Instead, one would have to choose either the ACF or an EB if both were offered as an incentive to motivate recruits to select a particular MOS. This delinkage marked a radical change in an enlistment incentive program that enabled GSA recruits to receive both incentives previous approximately a third of all; further, about one-half of those recruits receiving some monetary benefits received both the ACF and an EB. Additionally, the Army Recruiting Command implemented the so-called guidance counselor reforms and guidance counselor incentives, whereby the counselors prioritized

4. Approximately 27 percent of all GSA contracts and 43 percent of those receiving monetary incentives received both the ACF and an EB.

the MOS listings presented to recruits and were rewarded for succeeding in "selling" the prioritized MOSs. Because only two quarters of data since delinkage were available, they were merged with data from 21 earlier quarters to yield a data set of 23 quarters over 54 battalions,[5] giving a pooled, cross-sectional, time series data set with 1,242 (54 x 23) cells of data. In addition to quarterly dummies (to capture known seasonal effects), the authors also included special policy dummies for the 22nd and 23rd quarters (the periods after delinkage) and a special dummy for the 23rd quarter related to the initiation of guidance counselor reforms, all of which turned out to be very significant. The inclusion of these special dummies attempted to account somewhat for the new character of the ACF and EB incentives and the guidance counselor reforms by allowing for a shift in the intercepts, compared to the other quarters. Unfortunately, the dummy technique requires that the slope parameters (related to elasticities) of various factors be the same for all quarters, i.e., before and after delinkage and before and after guidance counselor reforms. This assumed commonality (referred to as pooling) may indeed be in appropriate.

To help discern the appropriate allocations under the policy of delinkage and guidance counselor reforms, we have performed a new analysis where only experience <u>since</u> delinkage is utilized. The time period analyzed is CY86, i.e., from January through December 1986; the 54 battalions, over the four quarters of CY86, yield 216 cells. Of prime interest is a comparison of the efficient allocations of the ACF versus EB's, before and after delinkage, and changes in the total

5. Two battalions, San Juan and Miami, were excluded because of missing demographic data.

incentive budget needed to arrive at a given number and mix of contracts in a specified recruiting environment.

B. Goals - Contracts versus Active Duty Man-Years

As the key factor in the incentive-allocation and budget-generation process the allocation scheme utilizes, the Army's enlistment needs for GSA recruits by MOS. Previously these needs had been specified in terms of required numbers of contracts by MOS for a particular time period. Hence, prior regression analyses utilized the observed flow of contracts by MOS, as well as which, if any. Such factors as demographics, Army advertising, and Army recruiters, were also included. Contracts were used as the driving variables because incentives awarded are based on those available when an individual signs his contract. Indeed, the Army's current method for removing or using incentives for a given MOS is based in large part on the observed "fill rates," where MOS contract requirements are compared to contract attainments and management decisions are made as to whether or not the incentives are needed.

It could be argued, however, that merely numbers of GSA contracts by MOS may not be the right goal; perhaps the driving determinant in budget allocation should be the number of active duty man-years or combined active duty and reservist man years contracted for. The impact of different goals on the optimal allocation scheme becomes even more interesting when it is recognized that different incentives entail different terms of service, e.g., EBs are given only for 3 to 4 years of active duty service, whereas an ACF benefit is available for as little as a 2-year obligation. Hence, it is very likely that the 2-year ACF incentive may be quite cost-effective in terms of obtaining contracts

(without regard to length of term), but may not be as cost-effective as EBs when one looks at the man-years committed. Fortunately, for each contract obtained, the data base utilized contains the number of years of active duty contracted for (and the number of reservist man-years contracted for since active duty years plus reservist years must add up to 8). Hence, it is a straightforward matter to convert a given historical flow of contracts by MOS into a given historical flow of active duty and reservist man-years.

To summarize, we are interested in whether and how the efficient allocations vary when the goals are either contracts or active duty man-years. Knowledge of the cost and allocation impacts for each of these goals should help USAREC articulate and defend their budget requests and execute their operational budgets.

C. Sensitivity of Allocations to the Assumed Actuarial Cost for an ACF Taker

One of the key inputs to the allocation model is the assumed price per taker for each type of incentive. This price is an actuarial one: it is based on (1) when the expense is to be incurred (e.g., after training school for EBs or perhaps 4 years later for a 4-year ACF incentive), and (2) the fraction of those takers who will actually utilize the benefit. The AC benefit is the incentive type most heavily impacted by the latter uncertainty is the ACF benefit because planners have little but the usage rate for the GI Bill upon which to base their projected usage rates for this incentive.

Currently, the Army has to deposit in a DOD escrow account $2,659 for each 2-year ACF incentive, $3,326 for the 3-year ACF, and $3,329 for the 4-year ACF. However, many Army planners feel that these amounts are

too high because the usage rates will be lower than those projected. Indeed, the Army has proposed the following escrow amounts: $1,700 for the 2-year ACF, $2,565 for the 3-year ACF, and $2,735 for the 4-year ACF. Naturally, the lower the ACF actuarial price in the model, the more attractive that incentive mechanism becomes because of the lower total incentive budget needed and presumably the higher fraction of expenditures spent on the ACF mechanism. We show the results for these two sets of ACF prices in Section 4.2.

D. Robustness of Efficient Allocations Based on Estimation Technique Utilized

In the third report 21 MOSs were analyzed simultaneously when an additional efficiency-inducing constraint equation was adjoined to each of 21 cost equations to form a 42 equation system.[6] For each of the 21 MOSs, there are some 25 parameters to be estimated, for a total of about 525 parameters. The advantage of estimating all 42 equations simultaneously is that the impact of any omitted key explanatory variable in the model (such as demographics) is mitigated. However, the price paid for this simultaneous estimation capability is an increase in computer memory size and in computing time. Since the goal of the model is to develop the capability for USAREC to perform the allocation analysis on-site, it would be very desirable, if an approximate estimation scheme were available that could be run on a personal computer or on a micro computer.

To determine if this is possible, we decoupled or disaggregated the system of 42 equations into 21 separate two-equation systems. Thus,

---

[6]The 21 consists of the 20 Combat Arms MOSs and a catch-all for all non-Combat Arms MOSs.

we still have a cost equation and an efficiency inducing constraint equation for each MOS. However, the linkage among MOSs now relies solely on the competitive effects variables included in each cost equation.[7] Of major interest is a comparison of the allocation recommendations produced by the complete 42-equation system with those produced by the 21 two-equation systems. If the difference is small, then the personal computer capability is possible.

As will be seen in Section 2, the allocation recommendations are very robust across different estimation techniques, i.e., the key cost allocation recommendations and the generated budgets needed are very similar under the two approaches (contracts and man-years), thereby lending more credibility and usefulness to the basic model and philosophy.

To summarize the remainder of this report, Section 1 concludes with a summary of the raw observed outcomes, both for the first 22 quarters and for the period since delinkage; Section 2 deals with sensitivity issue (D), the robustness of streamlined allocation techniques; Section 3 deals with issue (B), man-years versus contracts; Section 4 deals with issue (C), the modified ACF actuarial cost; and Section 5 deals with issue (A), the analysis of post-delinkage data.

1.3 Summary of Outcomes

This section concludes with two important tables. Table 1 is a summary of raw data over the period FY81(2)-FY86(3). To illustrate, look at MOS 11X in Table 1. The total number of GSA contracts over the 22 -quarter period was

[7]Each MOS cost equation variables related to the contract requirement for the MOS in question as well as variables related to requirements for all other MOSs.

TABLE 1. MOS COST EXPENDITURES OVER 22 QUARTERS FY81(2) - FY86(3)

	MOS description	Number of GSA Contracts	Total cost expended in FY87 dollars	Avg. cost per GSA contract	Avg. Man-years obtained per contract	Avg. Value of ACF incentive (in FY87 dollars) per contract, given ACF incentive utilized*	Avg. value of EB incentive awarded (in FY87 dollars) per contract, given EB incentive utilized	Avg. man-years obtained from each GSA contract, given ACF incentive utilized	Avg. man-years obtained from each GSA contract, given EB incentive utilized	Avg. value of ACF incentive awarded (in FY87 dollars) per active duty man-year contracted, given ACF incentive utilized	Avg. value of EB incentive awarded (in FY87 dollars) per active duty man-year contracted, given EB incentive utilized
1)	11X Infantry	43,501	292.950	5,734	3.798	2,954	5,605	3.55	3.96	832	1,414
2)	12B Combat Engineer	5,288	29.220	5,526	3.640	2,910	3,830	3.30	3.30	882	958
3)	12C Bridge Crewman	1,031	3.300	3,201	3.480	2,827	3,351	2.62	4.00	1,079	838
4)	12F Engr. Trcvdy. Crewman	354	1.053	2,975	3.740	2,892	2,388	2.61	4.00	1,108	597
5)	13B Cannon Crewman	10,010	59.910	5,984	3.790	2,936	5,900	3.48	3.97	842	1,485
6)	13C Tacfire Opns. Sp.	375	1.470	3,920	3.810	2,891	2,622	2.96	4.00	974	656
7)	13E Cannon Fire Sp.	1,954	13.410	6,863	3.870	2,931	5,605	3.50	4.00	837	1,403
8)	13F Fire Support Sp.	3,852	22.901	5,945	3.760	2,879	5,686	3.30	4.00	873	1,421
9)	13M MLRS Crewman	716	4.024	5,620	3.880	3,016	4,475	3.20	4.00	942	1,119
10)	13R Firefinder Radar Sp.	474	1.790	3,776	3.810	2,887	2,633	2.98	4.00	967	658
11)	15E Pershing MSL Crewman	1,939	14.450	7,452	3.840	2,933	5,595	3.45	4.00	850	1,399
12)	15J MLRS Lance Op. Fed. Sp.	383	1.150	3,003	3.800	2,892	3,098	2.95	4.00	978	775
13)											
14)	16D Ada Short Rey. MSL Crewman	1,251	8.250	6,595	3.890	3,047	5,448	3.40	4.00	894	1,362
15)	16R Ada Short Reg. Gunnery Crewman	1,197	6.380	5,322	3.660	2,908	5,259	3.90	4.00	969	1,315
16)	16S Manpads Crewman	1,349	7.270	5,389	3.810	2,967	4,864	3.13	4.00	947	1,216
17)	16X Air Defense	2,066	13.590	6,578	3.680	2,977	4,658	3.42	4.00	870	1,165
18)	19E Armor Crewman	5,502	31.470	5,720	3.680	2,905	4,895	3.33	3.99	872	1,228
19)	19D Cavalry Scout	71	0.440	6,197	3.890	3,285	4,729	3.60	3.89	915	1,216
20)	19K Armor Crewman M1 Tank	2,355	15.510	6,586	3.810	2,978	5,762	3.31	3.98	899	1,449
21)	All non-Combat Arms MOSs	249,206	591.280	2,373	3.450	2,907	3,959	3.15	4.00	921	990
	Grand Total	332,874	1,119.810	3,364							

43,501, with a total incentive cost (in FY87 dollars) of $292.95M. The average cost per GSA contract was $6,734, and the average number of active duty man-years per contract obtained was 3.798. If the ACF mechanism was used, its average cost was $2,954 the average cost per active duty man-years obtained was 3.55, and the average cost per active duty man-year was $8832. If the EB mechanism was used, its average cost was $5,605, the average number of active duty man-years obtained was 3.96, and the average cost per active duty man-year was $1,414.

Now consider table 2, which focuses on experience since delinkage, i.e., after December 1985. Note, for MOS 11X, the increase in ACF usage after delinkage, from 40.2 to 50.7 percent. Note too the large drop in cost per GSA contract from $6,735 to $3,503. Note (last line of table 2) overall that ACF usage increased from 52.7 to 61.1 percent, and that the average cost per GSA contract dropped from $3,364 to $2,005.

2.0 THE PERFORMANCE OF SIMULTANEOUS AND DISAGGREGATED MODELS OF INCENTIVE COST ALLOCATION

2.1 Problem Definition

The incentive cost allocation model has been estimated and validated for a system of MOSs simultaneously. The reason for simultaneous estimation is that the cost allocation equations for one MOS are not unrelated to the cost allocation equations for another MOS. They are only "seemingly unrelated," being linked through the common influence of omitted variables that affect incentive cost and its allocation in all MOSs. Since cost allocation equations are related across MOSs, a systems estimator is necessary. Estimation of incentive cost allocation models for each MOS in such

Table 2. Actual national outcomes for four quarters (after delinkage) and comparisons with past

	MOS description	No. of net GSA contracts in CY86	Total actual cost in CY86 ($M)	Actual incentive cost per GSA contract for four quarters after delinkage	Average percent devoted to ACF after delinkage	Average cost per GSA contract over first 22 quarters	Average percent devoted to ACF for first 22 quarters
1)	11X (Infantry)	8,478	29.700	$3,503	50.7	$6,735	40.2
2)	12B (Combat Eng.)	1,503	4.060	2,701	69.5	4,691	52.4
3)	12C (Bridge Crew)	241	0.650	2,697	28.6	3,201	38.4
4)	12F (Eng. Truck Crewman)	67	0.186	2,776	23.4	3,034	19.4
5)	13B (Cannon Crewman)	2,705	9.740	3,601	25.2	6,985	37.5
6)	13C (Tacfire Opns. Sp.)	78	0.233	2,987	22.1	3,941	17.9
7)	13E (Cannon Fire Sp.)	351	0.980	2,792	33.1	6,868	26.3
8)	13F (Fire Support Sp.)	503	1.408	2,793	35.1	5,947	34.8
9)	13M (MLRS Crewman)	155	0.515	3,323	28.5	5,644	15.1
10)	13R (Firefinder Radar Sp.)	50	0.146	2,920	17.2	3,801	18.6
11)	15E (Pershing MSL Crewman)	219	0.682	3,114	30.2	7,456	30.0
13)	16H* (ADA Op. Intel. Asst.)	145	0.451	3,110	39.4	3,977	18.5
14)	16P (ADA Short Rg. MSL Crewman)	82	0.325	3,533	0	6,555	17.9

*Analysis for twelfth MOS (MOS 15J) was not possible due to missing data.

Table 2. (completed)

	MOS description	No. of net GSA contracts in CY86	Total actual cost in CY86 ($M)	Actual incentive cost per GSA contract for four quarters after delinkage	Average percent devoted to ACF after delinkage	Average cost per GSA contract over first 22 quarters	Average percent devoted to ACF for first 22 quarters
15)	16R (ADA Short Rg. Gunnery Crewman)	198	0.637	3,217	33.3	5,322	33.98
16)	16S (Manpads Crewman)	205	0.659	3,215	21.2	5,389	19.40
17)	16X (Air Defense)	279	0.877	3,143	17.5	6,578	31.98
18)	19E (Armor Crewman)	1,093	3.290	3,010	60.6	5,720	47.20
19)	19D (Cavalry Scout)	303	0.929	3,066	16.6	6,197	1.40
20)	19K (Armor Crewman MI Tank)	1,183	3.383	2,860	40.3	6,593	26.10
21)	All non-Combat Arms MOSs	52,781	82.796	1,569	76.7	2,373	65.00
Overall		70,629	141.644	2,005	61.1	3,364	52.70

circumstances would produce biased parameter estimates and might have an adverse impact on predictive accuracy.

The disadvantage of the full systems approach (the 42-equation system) is that the size of the simultaneous system to be estimated is equal to the product of the number of incentives being applied and the number of MOSs being examined. We already have had experience with the 2 x 21 = 42 equation case. Larger systems require large computer capacity, while a personal computer needs small systems. Since the Army has typically allocated incentives to about 30 percent of some 300 MOSs, simultaneous analysis of all incentivized MOSs is infeasible with existing computer power. Thus, what is required is simultaneous estimation of a small number of "important" MOSs, as we have done, or separate estimation of a larger number of MOSs. As already mentioned, the latter approach risks a loss of accuracy by ignoring linkages among MOS incentive cost allocation systems.

The problem, then, is to compare the performance of the two approaches. If the disaggregated approach (the 21 separate two-equation systems) compares favorably with the full systems (the 42 separate two-equation systems) approach, two benefits are realized: (1) the number of MOSs being analyzed can be increased, and (2) each MOS can be analyzed with a personal computer.

2.2 The Incentive Cost Allocation Model

Approximately 90 of the roughly 300 MOSs offer monetary incentives at any given time. Of these, 20 of the most significant, in terms of number of recruits and incentive dollars expended, are in the Combat Arms cluster. To illustrate the ability of the incentive cost allocation model to perform at the MOS level (where decisions concerning the use and removal of incentives are actually made), we apply it to a list of 21 groupings: 20 individual MOSs

in the Combat Arms cluster and a catchall grouping consisting of all other MOSs. The 20 Combat Arms MOSs are easily characterized: prior to delinkage in December 1985, all were assigned the ACF, most offered an EB in amounts ranging from $2,000 to $8,000, most offered the joint ACF/EB option, and most offered the 2-year option. Only a few offered the station-of-choice incentive, and nearly all were designated as nonfemale.

The incentive cost allocation model is exercised on a data base consisting of 21 MOSs (including the catchall MOS) observed over 54 battalions for 22 quarters from FY81(2) to FY86(3). The model is enriched in a number of respects relative to some of the earlier versions.

The incentive cost allocation model, consisting of the incentive cost function and its associated ACF share equation, is given by:

$$\begin{aligned} \ln \mathrm{COST}_j = {} & \alpha_0 + \alpha_1 \ln y_j + \alpha_{11}(\ln y_j)^2 + \alpha_2 \ln\Big(\sum_{k \neq j} y_k\Big) \\ & + \alpha_3\, \mathrm{DFY86(3)} + \alpha_4 \ln(\mathrm{PACF/PEB}) \ln y_j \\ & + \alpha_5 \ln q + \sum_{i=1}^{5} b_i\, \mathrm{DFY}_i + b_6\, \mathrm{DFY86(2)} + \alpha_6 \mathrm{DSTA} \\ & + \alpha_7 \ln(\mathrm{PACF/PEB}) + \frac{1}{2}\alpha_8 (\ln(\mathrm{PACF/PEB}))^2 \\ & + \sum_{i=1}^{5} c_i \ln z_i + \sum_{i=1}^{3} d_i \mathrm{DQTR}_i \end{aligned}$$

$$\mathrm{SHACF}_j = \theta_7 + \alpha_8 \ln(\mathrm{PACF/PEB}) + \alpha_4 \ln y_j$$

Here, $j=1 \ldots,21$ indexes the 20 MOSs and the catchall grouping: for each j, the variables are observed for 22 quarters over 54 battalions. Variables are

defined as follows:

$COST_j$ = total incentive expenditure in MOS j;

$SHACF_j$ = share of total incentive expenditure allocated to the ACF option in MOS j;

y_j = number of GSA net contracts in MOS j;

$\sum_{k \neq j} y_k$ = number of GSA net contracts outside MOS j (competitive effect);

DFY86(3) = binary dummy variable (guidance counselor reform and DELINK) set to $\log_e 2$ in FY86(3), zero otherwise ;

PACF = price index for the ACF option;

PEB = price index for the EB option;

q = number of non-GSA net contracts in all MOSs (competitive effect);

DFY_i = binary dummy variable for FY82-FY86;

DFY86(2) = binary dummy variable (DELINK) set to $\log_e 2$ in FY86(2), zero otherwise;

DSTA = binary dummy variable set to $\log_e 2$ if station-of-choice option is available, zero otherwise;

z_i = environmental variables, with;

z_1 = number of production recruiter man-months;

z_2 = GSA-eligible population;

z_3 = unemployment rate;

z_4 = military/civilian pay ratio;

z_5 = Army advertising placement cost, lagged one quarter;

$DQTR_i$ = dummy variables for quarters 1-3 (seasonal effects).

Incentive cost and its allocation are determined primarily by the number of contracts obtained and by incentive prices. Incentive cost is also influenced by two types of competitive effects, those from other MOSs and those from non-GSA net contracts. It is further influenced by DELINK, by

guidance counselor reforms, and by five environmental variables that influence recruiting success. It is even affected by the availability of a nonmonetary incentive, the station-of-choice option. Finally, seasonal and yearly effects are included in the model.

An important feature of the incentive cost allocation model appears in the intercept term of $SHACF_j$. If the ACF and EB incentives are allocated optimally, in a cost-minimizing fashion, then $\theta_7 = \alpha_7$, where α_7 is the coefficient of ln(PACF/PEB) in ln $COST_j$. This equality is a fundamental result in the mathematics of optimization. If $\theta_7 \neq \alpha_7$, then incentives are not being allocated in a cost minimizing fashion. Moreover, $\theta_7 \gtrless \alpha_7$ signals over- or under-usage of the ACF option relative to cost-efficient usage. Thus, a comparison of the estimated values of θ_7 and α_7 shows direction and relative magnitude of any misallocation of the ACF and EB options in each of the 21 MOSs.

2.3 Estimation of the Incentive Cost Allocation Model

The system of 2 x 21 = 42 equations is estimated on a panel consisting of 54 recruiting battalions and 22 quarters for the period from FY81(2) to FY86(3). Estimation is carried out in two different ways: (1) simultaneous estimation of the full 42-equation system (the full system approach) using Zellner's "Seemingly Unrelated Regressions" technique and (2) separate estimation of 21 systems of two equations each, one system for each of the 21 MOSs (the disaggregated approach), by Zellner's "Seemingly Unrelated Regressions" technique. Although the 21 two-equation systems are estimated separately, a degree of interdependence is maintained through the results of the competitive effects variables ln Σy_k and lnq.

Results of the two approaches to estimation are shown in tables 3-23; results of validation tests for the two approaches appear in table 24. In discussing results we focus on MOS 11X, the largest and most costly MOS. Results for other MOSs are similar.

Explanatory power of both approaches is high. The 42-equation system has an adjusted R^2 of 0.850. The 21 two-equation systems have adjusted R^2s ranging from 0.963 to 0.571, with values of 0.917 and 0.822 in the two largest groupings, MOS 11X and the non-Combat Arms catchall category. This suggests that the incentive cost allocation model is reasonably well specified.

The primary variables influencing incentive cost and its allocation - the number of contracts obtained and incentive prices - have statistically significant coefficients (designated with an asterisk) that are very close numerically in both estimation approaches. Both approaches agree on the way contracts and incentive prices influence incentive cost and its allocation.

There is additional concurrence, although somewhat less pronounced, on the way several other variables influence incentive cost and its allocation. The positive sign and statistical significance of the coefficient for the competitive effect variable, $\ln \sum_{k \neq j} y_k$, are the same for both approaches. The same is true for the negative sign and statistical significance of the coefficients for the DELINK dummy variable, DFY86(2), and the guidance counselor reforms dummy variable, DFY86(3). There is agreement on the positive sign and the statistical significance of the coefficients for the three seasonal effects dummy variables, $DQTR_1$, $DQTR_2$, and $DQTR_3$. There is also agreement on the negative sign and the statistical significance of the coefficient for the size of the GSA-eligible population, $\ln z_2$.

The effects of the remaining variables on incentive cost and its allocation are generally statistically insignificant, small in magnitude, and

Table 3. MOS 11X (Infantry), FY81(2)–FY86(3) GSA contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	0.865*	0.832*
$\ln y_j$	a_1	1.033*	1.039*
$(\ln y_j)^2$	a_{11}	-0.007*	-0.008*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.059	0.062*
DFY86(3)	a_3	-0.232*	-0.219*
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.016*	-0.021*
$\ln q$	a_5	-0.019	-0.026
DFY82	b_1	-0.002	-0.001
DFY83	b_2	0.095*	0.100*
DFY84	b_3	-0.152	0.055
DFY85	b_4	-0.174*	-0.165*
DFY86	b_5	-0.156*	-0.134*
DFY86(2)	b_6	-0.325*	-0.314*
DSTA	a_6	0	0
ln(PACF/PEB)	a_7	0.546*	0.486*
$(\ln(\text{PACF/PEB}))^2$	a_8	0.115*	0.118*
$\ln z_1$	c_1	0.001	0.006
$\ln z_2$	c_2	-0.068*	-0.069*
$\ln z_3$	c_3	0.011	0.016
$\ln z_4$	c_4	-0.003	0.000
$\ln z_5$	c_5	-0.001	-0.001
$DQTR_1$	d_1	0.070*	0.071*
$DQTR_2$	d_2	0.114*	0.112*
$DQTR_3$	d_3	0.110	0.108*
Intercept of cost share equation	δ_7	0.490	0.476*
Adjusted R^2		0.850	.917

*=statistically significant coefficient.

Table 4. MOS 12B (Combat Engineer) FY81(2)-FY86(3) GSA Contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	0.318	0.879
$\ln y_j$	a_1	1.094*	1.087*
$(\ln y_j)^2$	a_{11}	0.024*	0.022*
$\ln (\sum_{k \neq j} y_k)$	a_2	0.083	0.088
DFY86(3)	a_3	-0.824*	-0.792*
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.064*	-0.067*
$\ln q$	a_5	-0.135	-0.140
DFY82	b_1	0.389*	0.297*
DFY83	b_2	0.262	0.208
DFY84	b_3	0.301	0.191
DFY85	b_4	0.374	0.225
DFY86	b_5	0.269	0.095
DFY86(2)	b_6	-0.768*	-0.688*
DSTA	a_6	1.186	0.610
ln(PACF/PEB)	a_7	0.791*	0.869*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.072*	-0.038*
$\ln z_1$	c_1	0.277	0.285*
$\ln z_2$	c_2	-0.250*	-0.261*
$\ln z_3$	c_3	0.020	0.030
$\ln z_4$	c_4	0.041	0.035
$\ln z_5$	c_5	0.007	-0.001
$DQTR_1$	d_1	0.079	0.113
$DQTR_2$	d_2	0.213*	0.225*
$DQTR_3$	d_3	0.163	0.178*
Intercept of cost share equation	θ_7	0.429*	0.445*
Adjusted R^2			0.815

* = statistically significant coefficient.

Table 5. MOS 12C (Bridge Crewman) FY81(2)-FY86(3) GSA Contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	-1.769	-2.259*
$\ln y_j$	a_1	1.119*	1.151*
$(\ln y_j)^2$	a_{11}	0.049*	0.055*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.065	0.015
DFY86(3)	a_3	-0.253	-0.184
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.122*	0.128*
$\ln q$	a_5	0.045	0.058
DFY82	b_1	1.068*	1.025
DFY83	b_2	1.315*	1.415*
DFY84	b_3	1.331*	1.340*
DFY85	b_4	1.950*	2.013*
DFY86	b_5	2.299*	2.392*
DFY86(2)	b_6	-0.354	-0.400
DSTA	a_6	-0.145	-0.234
ln(PACF/PEB)	a_7	0.709*	0.644
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.424*	-0.449*
$\ln z_1$	c_1	-0.014	-0.011
$\ln z_2$	c_2	0.054	0.053
$\ln z_3$	c_3	0.311*	0.301*
$\ln z_4$	c_4	0.095	0.057
$\ln z_5$	c_5	-0.097	-0.101
DQTR_1	d_1	-0.290*	-0.259*
DQTR_2	d_2	-0.406*	-0.473*
DQTR_3	d_3	-0.175	-0.187
Intercept of cost share equation	θ_7	0.549*	0.555*
Adjusted R^2			0.797

* = statistically significant coefficient.

Table 6. MOS 12F (Engr. Trvely Crewman) FY81(2)-FY86(3) GSA Contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	-0.542	0.307
$\ln y_j$	a_1	1.661*	1.515*
$(\ln y_j)^2$	a_{11}	0.149*	0.120*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.043	-0.012*
DFY86(3)	a_3	-0.261	-0.282
ln (PACF/PEB) $\ln y_j$	a_4	0.133*	0.139*
$\ln q$	a_5	0.011	0.003
DFY82	b_1	0.010	-0.033
DFY83	b_2	0.080	-0.107
DFY84	b_3	0.124	-0.013
DFY85	b_4	0.355	0.183
DFY86	b_5	0.484	0.245
DFY86(2)	b_6	-0.556*	-0.457*
DSTA	a_6	0.235*	0.174
ln(PACF/PEB)	a_7	1.567*	1.350*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.299*	-0.332*
$\ln z_1$	c_1	0.018	-0.004
$\ln z_2$	c_2	-0.087	-0.116
$\ln z_3$	c_3	-0.030	-0.002
$\ln z_4$	c_4	0.042	0.071
$\ln z_5$	c_5	0.010	0.026
$DQTR_1$	d_1	0.012	0.004
$DQTR_2$	d_2	0.018	0.073
$DQTR_3$	d_3	0.079	0.073
Intercept of cost share equation	θ_7	0.844*	0.879*
Adjusted R^2			0.815

* = statistically significant coefficient.

Table 7. MOS 13B (Cannon Crewman) FY81(2)-FY86(3) GSA Contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	0.487	0.584
$\ln y_j$	a_1	1.012*	1.024*
$(\ln y_j)^2$	a_{11}	0.032*	0.033*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.244*	0.233*
DFY86(3)	a_3	0.092	0.178
$\ln(\text{PACF/PEB}) \ln y_j$	a_4	0.017*	-0.020*
$\ln q$	a_5	-0.027	-0.033
DFY82	b_1	-0.164	-0.285
DFY83	b_2	-0.246	-0.371*
DFY84	b_3	-0.166	0.288
DFY85	b_4	-0.436*	-0.524*
DFY86	b_5	-0.576*	-0.643*
DFY86(2)	b_6	-0.323	-0.300
DSTA	a_6	0.183	0.263
ln(PACF/PEB)	a_7	0.711*	0.639*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.045*	-0.035*
$\ln z_1$	c_1	0.095	0.088
$\ln z_2$	c_2	-0.208*	-0.214*
$\ln z_3$	c_3	0.005	0.026
$\ln z_4$	c_4	-0.227*	-0.217*
$\ln z_5$	c_5	0.052	0.051
DQTR_1	d_1	0.182	0.184
DQTR_2	d_2	0.023	0.029
DQTR_3	d_3	-0.080	-0.064
Intercept of cost share equation	θ_7	0.285*	0.295*
Adjusted R^2			0.698

* = statistically significant coefficient.

Table 8. MOS 13C (Tacfire Opns. Sp.) FY81(2)-FY86(3) GSA Contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	0.152	0.081
$\ln y_j$	a_1	1.385*	1.392*
$(\ln y_j)^2$	a_{11}	0.078*	0.080*
$\ln (\sum_{k \neq j} y_k)$	a_2	-0.028	0.001
DFY86(3)	a_3	-0.183	-0.106
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.127*	0.127*
$\ln q$	a_5	0.007	0.007
DFY82	b_1	0.145	0.024
DFY83	b_2	0.171	0.132
DFY84	b_3	0.288	0.203
DFY85	b_4	0.222	0.127
DFY86	b_5	0.085	0.030
DFY86(2)	b_6	-0.269	-0.273
DSTA	a_6	-0.018	0.038*
ln(PACF/PEB)	a_7	1.214*	1.158*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.219	-0.227*
$\ln z_1$	c_1	-0.151	-0.139
$\ln z_2$	c_2	0.021	0.009
$\ln z_3$	c_3	0.017	0.013
$\ln z_4$	c_4	-0.079	-0.103
$\ln z_5$	c_5	0.029	0.035
DQTR_1	d_1	0.148	0.175*
DQTR_2	d_2	0.138	0.134
DQTR_3	d_3	0.176*	0.176*
Intercept of cost share equation	θ_7	0.733*	0.733*
Adjusted R^2			0.878

* = statistically significant coefficient.

Table 9. MOS 13E (Cannon Fd. Sp.) FY81(2)-FY86(3) GSA Contracts

		Parameter Estimates	
Variable	Parameter	All 21 MOSs estimated simultaneously	Each MOS estimated individually
Intercept	a_0	0.722	0.407
$\ln y_j$	a_1	1.164*	1.165*
$(\ln y_j)^2$	a_{11}	0.033*	0.033*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.049	-0.023
DFY86(3)	a_3	0.209	0.202
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.067*	0.066*
$\ln q$	a_5	-0.011	0.010
DFY82	b_1	0.129	-0.040
DFY83	b_2	-0.092	-0.123
DFY84	b_3	-0.169	0.202
DFY85	b_4	-0.203	-0.236
DFY86	b_5	-0.901*	-0.862*
DFY86(2)	b_6	-0.233*	-0.234*
DSTA	a_6	-0.072	-0.052
$\ln$(PACF/PEB)	a_7	1.045*	1.051*
$(\ln$(PACF/PEB)$)^2$	a_8	-0.003	0.023
$\ln z_1$	c_1	0.012	0.022
$\ln z_2$	c_2	0.001	0.003
$\ln z_3$	c_3	0.005	0.007
$\ln z_4$	c_4	-0.058	-0.084
$\ln z_5$	c_5	0.012	0.003
$DQTR_1$	d_1	0.188	0.209
$DQTR_2$	d_2	0.258*	0.230*
$DQTR_3$	d_3	0.004	0.011
Intercept of cost share equation	$\breve{\alpha}_7$	0.384*	0.413*
Adjusted R^2			0.860

* = statistically significant coefficient.

Table 10. MOS 13F (Fire Support Sp.) FY81(2)-FY86(3) GSA Contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	2.099	2.855*
$\ln y_j$	a_1	1.206*	1.203*
$(\ln y_j)^2$	a_{11}	0.091*	0.088*
$\ln (\sum_{k \neq j} y_k)$	a_2	0.459*	0.525*
DFY86(3)	a_3	-0.319	-0.057
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.032	0.034
$\ln q$	a_5	-0.113	-0.216
DFY82	b_1	-0.679*	-0.890*
DFY83	b_2	-0.352	0.606
DFY84	b_3	-1.743*	-2.106*
DFY85	b_4	-4.275*	-4.582*
DFY86	b_5	-2.476*	-3.012*
DFY86(2)	b_6	-0.961*	-0.891*
DSTA	a_6	0.029	-0.021
ln(PACF/PEB)	a_7	2.980*	3.062*
$(\ln(\text{PACF/PEB}))^2$	a_8	0.296*	0.291*
$\ln z_1$	c_1	0.020	0.074
$\ln z_2$	c_2	-0.271	-0.312
$\ln z_3$	c_3	-0.023	0.003
$\ln z_4$	c_4	-0.414*	-0.377
$\ln z_5$	c_5	-0.016	-0.048
$DQTR_1$	d_1	0.915*	1.000*
$DQTR_2$	d_2	0.698*	0.668*
$DQTR_3$	d_3	0.981	0.940*
Intercept of cost share equation	β_7	0.733*	0.726*
Adjusted R^2		.85	0.571

Table 11. MOS 13M (MLRS Crewman) FY81(2)-FY86(3) GSA Contracts

		Parameter Estimates	
Variable	Parameter	All 21 MOSs estimated simultaneously	Each MOS estimated individually
Intercept	a_0	1.626*	1.158
$\ln y_j$	a_1	1.418*	1.427*
$(\ln y_j)^2$	a_{11}	0.096*	0.097*
$\ln (\sum_{k \neq j} y_k)$	a_2	0.034	0.048
DFY86(3)	a_3	0.210	0.144
ln (PACF/PEB) $\ln y_j$	a_4	0.069*	0.074*
$\ln q$	a_5	-0.131	-0.088
DFY82	b_1	-0.118	-0.063
DFY83	b_2	-0.307	-0.256
DFY84	b_3	0.078	0.198
DFY85	b_4	0.259	0.377
DFY86	b_5	-0.427	0.262
DFY86(2)	b_6	0.506	0.425
DSTA	a_6	0.273	0.309*
ln(PACF/PEB)	a_7	1.940*	1.805*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.494*	-0.517*
$\ln z_1$	c_1	0.067	0.051
$\ln z_2$	c_2	-0.122	-0.104
$\ln z_3$	c_3	0.076	0.060
$\ln z_4$	c_4	-0.037	-0.056
$\ln z_5$	c_5	0.015	0.008
DQTR_1	d_1	-0.089	-0.123
DQTR_2	d_2	-0.226*	-0.237*
DQTR_3	d_3	-0.298*	-0.307*
	[illegible]$_7$	-0.003	-0.005
Adjusted R^2			0.859

*=statistically significant coefficient.

Table 12. MOS 13R (Firefinder Radar Sp.), FY81(2)- FY86(3) GSA Contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	0.739	0.863
$\ln y_j$	a_1	1.384*	1.384*
$(\ln y_j)^2$	a_{11}	0.093*	0.092*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.017	0.029
DFY86(3)	a_3	-0.088	-0.015
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.112*	0.114*
$\ln q$	a_5	-0.076	-0.085
DFY82	b_1	-0.067	-0.096
DFY83	b_2	-0.655*	-0.648*
DFY84	b_3	0.098	-0.062
DFY85	b_4	0.003*	-0.199
DFY86	b_5	0.053	-0.220
DFY86(2)	b_6	-0.254*	-0.073
DSTA	a_6	0.475*	0.508*
ln(PACF/PEB)	a_7	1.314*	1.363*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.178*	-0.166*
$\ln z_1$	c_1	0.026	0.022
$\ln z_2$	c_2	-0.152	-0.151
$\ln z_3$	c_3	0.033	0.046
$\ln z_4$	c_4	-0.141	0.150
$\ln z_5$	c_5	-0.059	0.041
$DQTR_1$	d_1	0.061	0.109
$DQTR_2$	d_2	0.161	0.177
$DQTR_3$	d_3	0.118	0.149
	ρ_7	0.648*	0.654*
Adjusted R^2			0.794

*statistically significant coefficient.

Table 13. MOS 15E (Pershing MSL Crewman), FY81(2)-FY86(3) GSA Contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	0.298	0.284
$\ln y_j$	a_1	1.201*	1.205*
$(\ln y_j)^2$	a_{11}	0.041*	0.042*
$\ln (\sum_{k \neq j} y_k)$	a_2	0.049	0.058
DFY86(3)	a_3	-0.315	0.282
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.069*	0.070*
$\ln q$	a_5	-0.002	-0.001
DFY82	b_1	0.096*	0.425*
DFY83	b_2	0.721*	0.689*
DFY84	b_3	0.337	0.315
DFY85	b_4	0.377	0.342
DFY86	b_5	0.130	0.188
DFY86(2)	b_6	-0.459*	-0.599*
DSTA	a_6	-0.030	0.080
ln(PACF/PEB)	a_7	1.004*	1.092*
(ln(PACF/PEB))^2	a_8	-0.154*	-0.114*
$\ln z_1$	c_1	-0.059	-0.051
$\ln z_2$	c_2	-0.010	-0.020
$\ln z_3$	c_3	-0.026	-0.010
$\ln z_4$	c_4	-0.195	-0.189
$\ln z_5$	c_5	0.028	0.025
$DQTR_1$	d_1	-0.013	-0.028
$DQTR_2$	d_2	0.134	0.120
$DQTR_3$	d_3	-0.039	-0.082
	θ_7	0.209*	0.260*
Adjusted R^2			0.897

*=statistically significant coefficient.

Table 14. MOS 15J (MLRS Lance Op.Fed. Sp.), FY81(2)-FY 86(3) GSA Contracts

		Parameter Estimates	
Variable	Parameter	All 21 MOSs estimated simultaneously	Each MOS estimated individually
Intercept	a_0	0.186*	-0.035
$\ln y_j$	a_1	1.536*	1.530*
$(\ln y_j)^2$	a_{11}	0.114*	0.113*
$\ln (\sum_{k \neq j} y_k)$	a_2	0.122	0.144*
DFY86(3)	a_3	-0.080	-0.012
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.128*	0.130*
$\ln q$	a_5	-0.023	-0.017
DFY82	b_1	0.190	0.170
DFY83	b_2	0.066	0.122
DFY84	b_3	0.252	0.217
DFY85	b_4	-0.062	-0.115
DFY86	b_5	-0.131	-0.149
DFY86(2)	b_6	0.097	0.132
DSTA	a_6	-0.044	-0.045
ln(PACF/PEB)	a_7	1.408*	1.501*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.005	0.017
$\ln z_1$	c_1	0.080	0.073
$\ln z_2$	c_2	-0.130	-0.124
$\ln z_3$	c_3	-0.019	-0.021
$\ln z_4$	c_4	0.026	0.003
$\ln z_5$	c_5	-0.040	-0.030
$DQTR_1$	d_1	0.034	0.040
$DQTR_2$	d_2	0.037	0.029
$DQTR_3$	d_3	0.073	0.082
	θ_7	0.699*	0.070*
Adjusted R^2			0.852

*=statistically significant coefficient.

Table 15. MOS 16H (Ada Op. Intel. Asst.), FY81(2)-FY 86(3) GSA contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs Estimated Simultaneously	Parameter Estimates: Each MOS Estimated Individually
Intercept	a_0		
$\ln y_j$	a_1		
$(\ln y_j)^2$	a_{11}		
$\ln(\sum_{k \neq j} y_k)$	a_2		
DFY86(3)	a_3		
$\ln$ (PACF/PEB) $\ln y_j$	a_4		
$\ln q$	a_5		
DFY82	b_1		
DFY83	b_2		
DFY84	b_3		
DFY85	b_4		
DFY86	b_5		
DFY86(2)	b_6		
DSTA	a_6		
ln(PACF/PEB)	a_7		
(ln(PACF/PEB))^2	a_8		
$\ln z_1$	c_1		
$\ln z_2$	c_2		
$\ln z_3$	c_3		
$\ln z_4$	c_4		
$\ln z_5$	c_5		
DQTR1	d_1		
DQTR2	d_2		
DQTR3	d_3		
Adjusted R^2			

Table 16. MOS 16P (Ada Short Rg. MSL Crewman), FY81(2)-FY 86(3), GSA contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	-1.030	-0.924
$\ln y_j$	a_1	1.461	1.506
$(\ln y_j)^2$	a_{11}	0.160	0.168*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.366	-0.393*
DFY86(3)	a_3	-0.577	-0.538
ln (PACF/PEB) $\ln y_j$	a_4	0.059	0.059*
$\ln q$	a_5	0.096	0.149
DFY82	b_1	0.266	-0.000
DFY83	b_2	-0.214	-0.424
DFY84	b_3	1.980	1.716*
DFY85	b_4	2.193	1.904*
DFY86	b_5	2.411	2.176*
DFY86(2)	b_6	-0.752	-0.623
DSTA	a_6	1.079	1.124*
ln(PACF/PEB)	a_7	1.933	1.878*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.108	-0.100*
$\ln z_1$	c_1	0.051	0.026
$\ln z_2$	c_2	0.061	0.061
$\ln z_3$	c_3	-0.012	0.010
$\ln z_4$	c_4	-0.127	-0.133
$\ln z_5$	c_5	-0.000	-0.027
$DQTR_1$	d_1	-0.473	-0.432*
$DQTR_2$	d_2	-0.401	-0.369*
$DQTR_3$	d_3	-0.653	-0.624*
	θ_7	0.208*	0.218*
Adjusted R^2			0.731

*statistically significant coefficient.

Table 17. MOS 16R (Ada Short Rg. Gunnery Crewman), FY81(2)-FY86(3) GSA contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	0.300*	0.008
$\ln y_j$	a_1	1.322*	1.308*
$(\ln y_j)^2$	a_{11}	0.085	0.083*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.164*	-0.137
DFY86(3)	a_3	-0.854*	-1.015*
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.106	0.101*
$\ln q$	a_5	0.104*	0.128
DFY82	b_1	1.151*	1.083*
DFY83	b_2	1.471*	1.360*
DFY84	b_3	2.589*	2.501*
DFY85	b_4	2.402*	2.417*
DFY86	b_5	2.546*	2.602*
DFY86(2)	b_6	-0.656*	-0.768*
DSTA	a_6	0.051	0.052
ln(PACF/PEB)	a_7	0.898*	0.884*
(ln(PACF/PEB))^2	a_8	-0.165*	-0.152*
$\ln z_1$	c_1	-0.186	-0.190
$\ln z_2$	c_2	-0.041	-0.031
$\ln z_3$	c_3	0.052	0.067
$\ln z_4$	c_4	0.002	0.002
$\ln z_5$	c_5	0.038	0.019
$DQTR_1$	d_1	-0.625*	-0.598*
$DQTR_2$	d_2	-0.444*	-0.433*
$DQTR_3$	d_3	-0.488*	-0.477*
	θ_7	0.384*	0.386*
Adjusted R^2			0.822

*statistically significant coefficient.

Table 18. MOS 16S (Manpads Crewman), FY81(2)-FY 86(3) GSA contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	0.121	-0.017
$\ln y_j$	a_1	1.519*	1.538*
$(\ln y_j)^2$	a_{11}	0.162*	0.164*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.271	-0.234*
DFY86(3)	a_3	-1.170*	-0.940*
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.058*	0.066*
$\ln q$	a_5	-0.093	-0.090
DFY82	b_1	0.190	-0.008
DFY83	b_2	0.880*	0.596*
DFY84	b_3	2.864*	2.636*
DFY85	b_4	3.037*	2.793*
DFY86	b_5	3.210*	2.953*
DFY86(2)	b_6	-1.458*	-1.421*
DSTA	a_6	0.009	0.120
ln(PACF/PEB)	a_7	2.194*	2.090
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.215*	-0.251
$\ln z_1$	c_1	-0.100	-0.080
$\ln z_2$	c_2	0.055	0.049
$\ln z_3$	c_3	0.119	0.107
$\ln z_4$	c_4	0.159	0.154
$\ln z_5$	c_5	0.111	0.099
$DQTR_1$	d_1	-0.400*	-0.352*
$DQTR_2$	d_2	-0.138	-0.167
$DQTR_3$	d_3	-0.314*	-0.363
	θ_7	0.116*	0.099*
Adjusted R^2			0.727

*statistically significant coefficient.

Table 19. MOS 16X (Air Defense), FY81(2)-FY86(3) GSA contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	-2.046	-1.712
$\ln y_j$	a_1	1.033*	1.276*
$(\ln y_j)^2$	a_{11}	0.086*	0.087*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.036	-0.041*
DFY86(3)	a_3	-0.149	-0.228
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.071*	0.070*
$\ln q$	a_5	0.147	0.159
DFY82	b_1	1.693*	1.410*
DFY83	b_2	2.172*	1.853*
DFY84	b_3	3.537*	3.347*
DFY85	b_4	3.834*	3.620*
DFY86	b_5	3.235*	2.966*
DFY86(2)	b_6	-0.577	-0.604
DSTA	a_6	0.686*	0.692*
ln(PACF/PEB)	a_7	2.208*	2.126*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.006	0.004
$\ln z_1$	c_1	-0.217	-0.218
$\ln z_2$	c_2	0.005	-0.013
$\ln z_3$	c_3	-0.231*	-0.200*
$\ln z_4$	c_4	-0.356*	-0.340*
$\ln z_5$	c_5	0.244	0.208*
$DQTR_1$	d_1	-0.020	0.021
$DQTR_2$	d_2	0.059	0.105
$DQTR_3$	d_3	0.094	0.112
	θ_7	0.422*	0.430*
Adjusted R^2			0.778

*statistically signficant coefficient.

Table 20. MOS 19E (Armor Crewman), FY81(2)-FY86(3) GSA contracts

		Parameter Estimates	
Variable	Parameter	All 21 MOSs estimated simultaneously	Each MOS estimated individually
Intercept	a_0	-0.354	-0.056
$\ln y_j$	a_1	1.064*	1.076*
$(\ln y_j)^2$	a_{11}	0.019*	0.020*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.073	0.066
DFY86(3)	a_3	-0.257	-0.353
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.050*	0.051*
$\ln q$	a_5	-0.010	-0.010
DFY82	b_1	0.344*	0.242
DFY83	b_2	0.293	0.170
DFY84	b_3	0.011	-0.116
DFY85	b_4	0.047	-0.050
DFY86	b_5	-0.294	-0.378
DFY86(2)	b_6	-0.574*	-0.613*
DSTA	a_6	0.264	0.247
$\ln$(PACF/PEB)	a_7	0.924*	0.957*
$(\ln(\text{PACF/PEB}))^2$	a_8	0.025	0.040*
$\ln z_1$	c_1	0.117	0.115
$\ln z_2$	c_2	-0.017	-0.038*
$\ln z_3$	c_3	-0.065	-0.044
$\ln z_4$	c_4	-0.056	-0.057
$\ln z_5$	c_5	-0.065	-0.073
$DQTR_1$	d_1	0.338*	0.365*
$DQTR_2$	d_2	0.241*	0.298*
$DQTR_3$	d_3	0.195*	0.237*
	θ_7	0.451*	0.464*
Adjusted R^2			0.752

*statistically significant coefficient.

Table 21. MOS 19D (Cavalry Scout), FY81(2)-FY86(3) GSA contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
intercept	a_0	-0.206	-0.234
$\ln y_j$	a_1	1.231*	1.250*
$(\ln y_j)^2$	a_{11}	0.038*	0.041*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.008	-0.006
DFY86(3)	a_3	0.134	0.123
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.056*	0.058*
$\ln q$	a_5	0.002	0.008
DFY82	b_1	0.002	0.003
DFY83	b_2	0.002	0.010
DFY84	b_3	0.013	0.014
DFY85	b_4	-0.017	0.023
DFY86	b_5	-0.089	-0.082
DFY86(2)	b_6	0.085	0.081
DSTA	a_6	0.024	0.016
ln(PACF/PEB)	a_7	-0.743*	-0.720*
$(\ln(\text{PACF/PEB}))^2$	a_8	-0.232*	-0.232*
$\ln z_1$	c_1	-0.011	-0.015
$\ln z_2$	c_2	0.012	0.015
$\ln z_3$	c_3	0.004	0.003
$\ln z_4$	c_4	0.018	0.014
$\ln z_5$	c_5	-0.001	-0.004
$DQTR_1$	d_1	-0.009	-0.007
$DQTR_2$	d_2	0.001	0.002
$DQTR_3$	d_3	-0.014	-0.007
	θ_7	0.131*	0.137*
Adjusted R^2			0.963

*stastically significant coefficient.

Table 20. MOS 19E (Armor Crewman), FY81(2)-FY86(3) GSA contracts

		Parameter Estimates	
Variable	Parameter	All 21 MOSs estimated simultaneously	Each MOS estimated individually
Intercept	a_0	-0.354	-0.056
$\ln y_j$	a_1	1.064*	1.076*
$(\ln y_j)^2$	a_{11}	0.019*	0.020*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.073	0.066
DFY86(3)	a_3	-0.257	-0.353
$\ln$ (PACF/PEB) $\ln y_j$	a_4	0.050*	0.051*
$\ln q$	a_5	-0.010	-0.010
DFY82	b_1	0.344*	0.242
DFY83	b_2	0.293	0.170
DFY84	b_3	0.011	-0.116
DFY85	b_4	0.047	-0.050
DFY86	b_5	-0.294	-0.378
DFY86(2)	b_6	-0.574*	-0.613*
DSTA	a_6	0.264	0.247
ln(PACF/PEB)	a_7	0.924*	0.957*
$(\ln(\text{PACF/PEB}))^2$	a_8	0.025	0.040*
$\ln z_1$	c_1	0.117	0.115
$\ln z_2$	c_2	-0.017	-0.038*
$\ln z_3$	c_3	-0.065	-0.044
$\ln z_4$	c_4	-0.056	-0.057
$\ln z_5$	c_5	-0.065	-0.073
$DQTR_1$	d_1	0.338*	0.365*
$DQTR_2$	d_2	0.241*	0.298*
$DQTR_3$	d_3	0.195*	0.237*
	θ_7	0.451*	0.464*
Adjusted R^2			0.752

*statistically significant coefficient.

Table 21. MOS 19D (Cavalry Scout), FY81(2)-FY86(3) GSA contracts

Variable	Parameter	Parameter Estimates: All 21 MOSs estimated simultaneously	Parameter Estimates: Each MOS estimated individually
Intercept	a_0	-0.206	-0.234
$\ln y_j$	a_1	1.231*	1.250*
$(\ln y_j)^2$	a_{11}	0.038*	0.041*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.008	-0.006
DFY86(3)	a_3	0.134	0.123
$\ln(PACF/PEB) \ln y_j$	a_4	0.056*	0.058*
$\ln q$	a_5	0.002	0.008
DFY82	b_1	0.002	0.003
DFY83	b_2	0.002	0.010
DFY84	b_3	0.013	0.014
DFY85	b_4	-0.017	0.023
DFY86	b_5	-0.089	-0.082
DFY86(2)	b_6	0.085	0.081
DSTA	a_6	0.024	0.016
$\ln(PACF/PEB)$	a_7	-0.743*	-0.720*
$(\ln(PACF/PEB))^2$	a_8	-0.232*	-0.232*
$\ln z_1$	c_1	-0.011	-0.015
$\ln z_2$	c_2	0.012	0.015
$\ln z_3$	c_3	0.004	0.003
$\ln z_4$	c_4	0.018	0.014
$\ln z_5$	c_5	-0.001	-0.004
$DQTR_1$	d_1	-0.009	-0.007
$DQTR_2$	d_2	0.001	0.002
$DQTR_3$	d_3	-0.014	-0.007
	θ_7	0.131*	0.137*
Adjusted R^2			0.963

*stastically significant coefficient.

sometimes contradictory in sign. The conclusion is that although these variables are, in principle, important determinants of incentive cost and its allocation; their influence is small and insignificant in reality .

We conclude that there is very little to choose between the two approaches in terms of parameter estimates. Both approaches agree on sign, statistical significance, and, to a lesser degree, magnitude of the coefficients for the variables most influential in determining incentive cost and its allocation. Disagreement between the two approaches is, by and large, limited to magnitudes of coefficients that are not statistically significant. The implication is that virtually nothing is lost by exchanging econometric rigor for convenience of implementation. The 21 two-equation systems tell essentially the same story as the single 42-equation system. We conclude, therefore, that the use of the two-equation systems on as many MOSs as desired is fully justified.

2.4 Validation of the Incentive Cost Allocation Model

After estimation, the incentive cost allocation model is validated by comparing the predicted and observed incentive cost and its allocation by quarter and by battalion. These comparisons are summarized in table 24 by aggregating the overall 22 x54 = 1188 observations. Since the 21 two-equation systems performed so well in the estimation stage, only these results are validated.

The estimated model tracks both observed cost and the observed ACF share with great accuracy over the entire period, as would be expected with the high adjusted R^2s reported above. The validation process, therefore, is considered to be accomplished.

Table 24. Validation exercises on FY81(2)-FY86(3) GSA contracts for five key MOSs

	Cost ($M)		ACF Share (%)		
MOS	Observed	Estimated	Observed	Estimated Inefficient	Estimated Efficient
11X	292.960	288.693	40	40	41
12B	29.219	28.521	52	52	94
13B	69.912	68.951	37	37	71
19K	15.527	15.248	26	26	100
All non-Combat Arms MOSs	591.283	571.167	65	65	65

As an adjunct to the validation stage we consider two possible sources of cost-saving. The first is as a result of a more efficient allocation of the ACF and EB incentives; it originates in a comparison of α_7 and θ_7 in tables 3-23, where $\alpha_7 \approx \theta_7$ in MOS 11X and the non-Combat Arms catchall grouping. Consequently, because observed and efficient ACF shares are approximately equal, there is little potential cost savings available in these two large MOS groupings. However, in the remaining 19 MOSs, where $\theta_7 > \alpha_7$ a potential cost-saving of unknown but substantial magnitude is available by increasing the usage of the ACF option.

The second potential cost saving source was actually realized in CY86; it is the result of the beneficial effects of DELINK and the guidance counselor reforms. The effects of these two events can be observed from the coefficients for DFY86(2) and DFY86(3) in tables 3-23. These coefficients are generally negative, as expected, and suggest considerable cost-savings to come. For example, in MOS 11X, the institution of DELINK ($b_6 = -0.314^*$) implies cost reductions of some 27 percent, while the additional institution of the guidance counselor reforms ($\alpha_3 = -0.219^*$) suggests a combined cost reduction of 20%. In the non-Combat Arms catchall grouping, the two cost reductions are 23 percent and 33 percent respectively.

2.5 Summary and Recommendation

We have discussed two approaches to estimation of the incentive cost allocation model. The full systems approach is theoretically appealing but it is costly and difficult to implement. It cannot be implemented on a personal computer; even on a mainframe, there is a limit to the number of MOSs that can be accommodated at any feasible level of computer time and cost. The

alternative MOS-by-MOS approach is tractable on a personal computer for as many MOSs as desired, at no discernible sacrifice in accuracy.

Using data for 54 battalions over 22 quarters, we find no meaningful difference between the two approaches at either the estimation stage or the validation stage. Our recommendation, then, is to adopt the MOS-by-MOS approach for analyzing incentive cost allocation.

3.0 EXCURSION EXPLORING DIFFERENCES IN OPTIMAL ALLOCATIONS WHEN ACTIVE DUTY GSA MAN-YEARS ARE USED AS DETERMINANTS INSTEAD OF GSA CONTRACTS

3.1 Problem Definition

The incentive cost allocation model has been estimated and validated using numbers of GSA contracts by MOS as the measure of enlistment goals. However, contracts run for 2, 3, or 4 years of active duty service, plus an additional 6, 5, or 4 years of reserve duty, for a total of 8 years per enlistment. This suggests that the incentive cost allocation model might yield additional insights into optimal incentive cost and its allocation if contracts were replaced with man-years as the measure of enlistment goals in the model. This likelihood is enhanced by the fact that different incentives entail different active duty length-of-Service requirements: the "ACF only" option has historically been a 2-, 3-, or 4-year active duty option; the "EB only" option has been a 4-year active duty option; and the "joint ACF and EB option" has been a 3- or 4-year active duty option. Thus, it is possible that 2-year "ACF only" option may be cost-effective in obtaining contracts, but much less so in obtaining active duty man-years. Conversely, the "EB only" option may be much more cost-effective in obtaining man-years than in obtaining contracts.

Given the problem definition as just described, the problem at hand is to do an incentive cost allocation analysis with contracts being replaced by some measure of man-years. The purpose of such an analysis is twofold: (1) to see whether the incentive cost allocation model "works" as well using man-years as it does with contracts, and (2) to see whether the judgements concerning the effectiveness of the Army's incentive allocation process are modified in any way after contracts are replaced with man-years.

3.2 Conversion of Contracts to Man-Years

To do the above-mentioned analysis, we must first convert contracts to man-years. We begin by listing the number of takers in each period of each type of contract and the price per contract for each of the 17 incentive options. Hence, $X_i(i=1,\ldots,17)$ refers to the number of takers of the i^{th} type of contract and $P_i(i=1,\ldots,17)$ refers to the price of the i^{th} type of contract. All contract prices have been adjusted by the Consumer Price Index using 1985(1) as the base period.

X_1 = 2-year takers of ACF only

X_2 = 3-year takers of ACF only

X_3 = 3-year takers of ACF plus $4,000 EB

X_4 = 4-year takers of ACF only

X_5 = 4-year takers of "low" EB only

X_6 = 4-years of "high" EB only

X_7 = 4-year takers of ACF plus $1,500 EB

X_8 = 4-year takers of ACF plus $2,000 EB

X_9 = 4-year takers of ACF plus $2,500 EB

X_{10} = 4-year takers of ACF plus $3,000 EB

X_{11} = 4-year takers of ACF plus $3,500 EB

X_{12} = 4-year takers of ACF plus $4,000 EB

X_{13} = 4-year takers of ACF plus $4,500 EB

X_{14} = 4-year takers of ACF plus $5,000 EB

X_{15} = 4-year takers of ACF plus $6,000 EB

X_{16} = 4-year takers of ACF plus $7,000 EB

X_{17} = 4-year takers of ACF plus $8,000 EB

P_1 = $2,659 * (CPI/CPI85-1), where $2,659 is the actuarial estimate in FY85 prices of the cost per taker for the 2-year ACF incentive

P_2 = $3,326 * (CPI/CPI85-1)

P_3 = P_2 + ($4,000 * (CPI/CPI85-1)

P_4 = $3,329 * (CPI/CPI85-1)

P_5 = $2,000 * (CPI/CPI85-1)

P_6 = $3,500 * (CPI/CPI85-1)

P_7 = P_4 + ($1,500 * (CPI/CPI85-1))

P_8 = P_4 + ($2,000 * (CPI/CPI85-1))

P_9 = P_4 + ($2,500 * (CPI/CPI85-1))

P_{10} = P_4 + ($3,000 * (CPI/CPI85-1))

P_{11} = P_4 + ($3,500 * (CPI/Cpi85-1))

P_{12} = P_4 + ($4,000 * (CPI/CPI85-1))

P_{13} = P_4 + ($4,500 * (CPI/CPI85-1))

P_{14} = P_4 + ($5,000 * (CPI/CPI85-1))

P_{15} = P_4 + ($6,000 * (CPI/CPI85-1))

P_{16} = P_4 + ($7,000 * (CPI/CPI85-1))

P_{17} = P_4 + ($8,000 * (CPI/CPI85-1))

Thus the total incentive expenditure for the period in question, was represented by the X vector, is:

$$COST = \sum_{j=1}^{17} p_j X_j$$

Expenditures for the ACF option and for the EB option, respectively, are given by:

$$\mathrm{AC}\qquad \mathrm{FEXP} = (P_1X_1 + P_2X_2 + P_4X_4 + P_2X_3 + \sum_{j=7}^{17} P_4X_j)$$

$$\mathrm{EB}\qquad \mathrm{EXP} = (P_5X_5 + P_6X_6 + (P_3\text{-}P_2)X_3 + \sum_{j=7}^{17} P_j\text{-}P_4)X_j)$$

Expenditure shares of the two options are given by:

ACFSH = ACFEXP/COST

EBSH = EBEXP/COST

Price indexes for the two options are given by the ratio of expenditures for each option to the number of takers of each option, i.e., the conditional average price of each option, given that the option was utilized:

$$\mathrm{PACF} = \mathrm{ACFEXP}/ \sum_{j\neq 5,6} X_j$$

$$\mathrm{PEB} = \mathrm{EBEXP}/ \sum_{j\neq 1,2,4} X_j$$

We next adjust quantities X_i and prices P_i to convert each to active duty man-years. We <u>multiply</u> X_i quantities by the number of active duty man-years obligated (e.g., $2X_1$, $3X_2,\ldots,4X_{17}$) and <u>divide</u> P_i prices by the number of active duty man-years obligated (e.g., $P_1/2$, $P_2/3,\ldots$, $P_{17}/4$). The resulting value of COST is unchanged, as are the resulting values of ACFEXP, EBEXP, ACFSH, and EBSH. PACF and PEB, however, are affected by the conversion because the denominator of each is changed.

Thus, the conversion from contracts to active duty man-years leaves the variables COST and ACFSH unchanged. It reduces the price indexes PACF and PEB, since they are defined on a per active duty man-year basis instead of a

per contract basis. It reduces PEB by more than it reduces PACF because the EB option generates longer term active duty enlistments.

Table 1 shows the average cost by MOS for a GSA man-year versus a GSA contract resulting from the application of the two types of incentives. For example, for MOS 12B, the average cost of the ACF benefit, given that the ACF benefit was utilized, was $2,910 (in FY87 dollars) per GSA contract; for the EB benefit, the average cost was $3,830 per contract. Therefore, everything else being equal, if contracts are the driving determinant (instead of man-years), and if one looks at the cost per GSA active duty man-year of $882 from the ACF side versus $958 per man-year from the EB perspective, the implication is that the use of the ACF incentive mechanism should be increased (relative to the use of the EB mechanism). As will be seen, this is indeed the case.

Note that only active duty man-years are being utilized. No use is being made of reserve duty man-years in this analysis. This is because all enlistments are obligated to 8 years of service (e.g., 2 + 6, 3 + 5, or 4 + 4). Operating the above procedures by multiplying all contracts by 8 and dividing all prices by 8 would leave everything unchanged. Estimation of such a model would be superfluous because it would generate exactly the same results as the model for contracts. Consequently, only active duty man-years have been considered.[8]

3.3 Estimation of the Active Duty Man-Years Incentive Cost Allocation Model

The active duty man-year model is specified in exactly the same way as the contracts model described in of Section 2.2. The only differences are in definitions of the following variables:

y_j = number of active duty man-years in MOS j;

[8] A version of the model where the outputs are the distinct number of 2, 3, and 4 year contracts by MOS is possible and should be one of the tasks in future efforts.

$\sum_{k \neq j} y_k$ = number of active duty man-years outside MOS j;

PACF = price index (per active duty man-year) for the ACF option;

PEB = price index (per active duty man-year) for the EB option.

Recall that the contracts version of the incentive cost allocation model was estimated in two different ways, once with all 21 MOSs simultaneously and once with each MOS separately. Since the latter approach worked so well with contract data and also can be installed at USAREC, it is the only approach used with the active duty man-years data. The estimation results for the 21 MOSs, again based on 54 battalions over 22 quarters from FY81(2) through FY86(3), appear in tables 27-48, which are structured exactly like tables 3-24. In both models, prices and quantities play the dominant roles in explaining incentive cost and its allocation. Competitive effects are also present in both models, as are the effects of DELINK and guidance counselor reforms.

To illustrate, let us consider the following comparisons for MOS 11X. Referring to table 1, the <u>actual</u> cost over 22 quarters for 43,501 GSA contracts and 165,217 active duty man-years was \$292.95M (in FY87 dollars). The actual cost value of the ACF benefit being utilized was \$2,954 per GSA contract versus \$5,605 for the average value of the EB being utilized, on \$832 per man-year for the ACF mechanism and \$1,414 per man-year for the EB mechanism. The actual share for the ACF mechanism was 40 percent. If GSA contracts is the driving force, then the efficient cost share for delivering 43,501 GSA contracts is about 41 percent for ACF (compared to the actual cost share of 40 percent). This is because the intercept in the cost share equation is 0.4760 whereas the coefficient of ln(PACF/PEB) in the cost equation is 0.4858. Hence the efficient share devoted to the ACF should be 0.4858-0.4760 = 0.0098 more. Thus, whereas the observed (and predicted

Table 27. MOS 11X (Infanty), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.762*
$\ln y_j$	a_1	1.054*
$(\ln y_j)^2$	a_{11}	-0.005*
$\ln (\sum_{k \neq j} y_k)$	a_2	-0.027*
DFY86(3)	a_3	-0.433*
$\ln(PACF/PEB) \ln y_j$	a_4	-0.013*
$\ln q$	a_5	0.025*
DFY82	b_1	0.128*
DFY83	b_2	0.055*
DFY84	b_3	0.047*
DFY85	b_4	-0.024
DFY86	b_5	0.059*
DFY86(2)	b_6	-0.511*
DSTA	a_6	0
$\ln(PACF/PEB)$	a_7	0.316*
$(\ln(PACF/PEB))^2$	a_8	0.103*
$\ln z_1$	c_1	0.018*
$\ln z_2$	c_2	-0.054*
$\ln z_3$	c_3	0.008
$\ln z_4$	c_4	-0.019*
$\ln z_5$	c_5	0.005
$DQTR_1$	d_1	0.054*
$DQTR_2$	d_2	0.038*
$DQTR_3$	d_3	0.044*
Intercept of cost share equation	c_7	0.449*
Adjusted R^2		0.979

*statistically significant coefficient.

Table 28. MOS 12B (Combat Engineer), FY81(2)-FY86(3) man years

Variable	Parameter	Estimate
Intercept	a_0	0.692
$\ln y_j$	a_1	1.058*
$(\ln y_j)^2$	a_{11}	0.001
$\ln(\sum_{k \neq j} y_k)$	a_2	0.064
DFY86(3)	a_3	-0.743*
$\ln(PACF/PEB)\ln y_j$	a_4	0.049*
$\ln q$	a_5	-0.071
DFY82	b_1	0.279*
DFY83	b_2	-0.364*
DFY84	b_3	-0.354*
DFY85	b_4	-0.347*
DFY86	b_5	-0.466*
DFY86(2)	b_6	-0.806*
DSTA	a_6	1.186
$\ln(PACF/PEB)$	a_7	0.378*
$(\ln(PACF/PEB))^2$	a_8	0.058*
$\ln z_1$	c_1	0.098*
$\ln z_2$	c_2	-0.151*
$\ln z_3$	c_3	0.023
$\ln z_4$	c_4	0.038
$\ln z_5$	c_5	-0.005
$DQTR_1$	d_1	-0.002
$DQTR_2$	d_2	-0.007
$DQTR_3$	d_3	-0.030
Intercept of cost share equation	θ_7	0.445*
Adjusted R^2		0.963

*statistically significant coefficient.

Table 29. MOS 12C (Bridge Crewman), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.204
$\ln y_j$	a_1	1.024*
$(\ln y_j)^2$	a_{11}	0.002
$\ln(\sum_{k \neq j} y_k)$	a_2	0.001
DFY86(3)	a_3	-0.329*
$\ln(PACF/PEB)\ln y_j$	a_4	0.108*
$\ln q$	a_5	-0.006
DFY82	b_1	-0.035
DFY83	b_2	-0.014
DFY84	b_3	0.012
DFY85	b_4	0.224*
DFY86	b_5	0.214*
DFY86(2)	b_6	-0.275*
DSTA	a_6	-0.044
$\ln(PACF/PEB)$	a_7	-0.100*
$(\ln(PACF/PEB))^2$	a_8	0.409*
$\ln z_1$	c_1	0.017
$\ln z_2$	c_2	0.005
$\ln z_3$	c_3	0.002
$\ln z_4$	c_4	0.018
$\ln z_5$	c_5	-0.014
$DQTR_1$	d_1	-0.054*
$DQTR_2$	d_2	-0.055*
$DQTR_3$	d_3	-0.011
Intercept of cost share equation	θ_7	0.428*
Adjusted R^2		0.979

*statistically significant coefficient.

Table 30. MOS 12F (Engr. Truck Crewman), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.822*
$\ln y_j$	a_1	0.991*
$(\ln y_j)^2$	a_{11}	-0.004
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.004
DFY86(3)	a_3	-0.061
$\ln(PACF/PEB)\ln y_j$	a_4	0.130*
$\ln q$	a_5	0.012
DFY82	b_1	0.036
DFY83	b_2	0.026
DFY84	b_3	0.088
DFY85	b_4	0.112
DFY86	b_5	0.080
DFY86(2)	b_6	-0.224*
DSTA	a_6	0.031
$\ln(PACF/PEB)$	a_7	-0.550*
$(\ln(PACF/PEB))^2$	a_8	0.292*
$\ln z_1$	c_1	0.007
$\ln z_2$	c_2	-0.017
$\ln z_3$	c_3	-0.021
$\ln z_4$	c_4	-0.008
$\ln z_5$	c_5	-0.002
$DQTR_1$	d_1	-0.033
$DQTR_2$	d_2	-0.019
$DQTR_3$	d_3	-0.017
Intercept of cost share equation	c_7	0.343*
Adjusted R^2		0.991

*statistically significant coefficient.

Table 31. MOS 13B (Cannon Crewman), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.128
$\ln y_j$	a_1	1.021*
$(\ln y_j)^2$	a_{11}	-0.002
$\ln(\sum_{k \neq j} y_k)$	a_2	0.058
DFY86(3)	a_3	-0.088
$\ln(PACF/PEB)\ln y_j$	a_4	0.019*
$\ln q$	a_5	0.010
DFY82	b_1	-0.128
DFY83	b_2	-0.097
DFY84	b_3	-0.102
DFY85	b_4	-0.031
DFY86	b_5	-0.281*
DFY86(2)	b_6	-0.294*
DSTA	a_6	0.074
$\ln(PACF/PEB)$	a_7	0.270*
$(\ln(PACF/PEB))^2$	a_8	0.017*
$\ln z_1$	c_1	-0.023
$\ln z_2$	c_2	-0.004
$\ln z_3$	c_3	0.001
$\ln z_4$	c_4	-0.084
$\ln z_5$	c_5	0.008
$DQTR_1$	d_1	0.019
$DQTR_2$	d_2	0.000
$DQTR_3$	d_3	0.031
	θ_7	0.340*
Adjusted R^2		0.942

*statistically significant coefficient.

Table 32. MOS 13C (Tacfire Opns. Sp.), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.594*
$\ln y_j$	a_1	1.000*
$(\ln y_j)^2$	a_{11}	-0.012*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.009
DFY86(3)	a_3	-0.119*
$\ln(PACF/PEB) \ln y_j$	a_4	0.111*
$\ln q$	a_5	0.018*
DFY82	b_1	0.010
DFY83	b_2	0.050*
DFY84	b_3	0.094*
DFY85	b_4	0.120*
DFY86	b_5	0.099*
DFY86(2)	b_6	-0.109*
DSTA	a_6	-0.002
$\ln(PACF/PEB)$	a_7	-0.529*
$(\ln(PACF/PEB))^2$	a_8	0.359*
$\ln z_1$	c_1	0.001
$\ln z_2$	c_2	0.007
$\ln z_3$	c_3	-0.007
$\ln z_4$	c_4	-0.010
$\ln z_5$	c_5	-0.000
$DQTR_1$	d_1	0.015
$DQTR_2$	d_2	-0.022*
$DQTR_3$	d_3	-0.023*
Intercept of cost share equation	7	0.320*
Adjusted R^2		0.999

*statistically significant cooefficient.

Table 33. MOS 13E (Cannon Fire Sp.), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.404
$\ln y_j$	a_1	1.113*
$(\ln y_j)^2$	a_{11}	0.020*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.011
DFY86(3)	a_3	0.009
$\ln(PACF/PEB)\ln y_j$	a_4	0.054*
$\ln q$	a_5	-0.011
DFY82	b_1	-0.141
DFY83	b_2	-0.173
DFY84	b_3	-0.234
DFY85	b_4	-0.207
DFY86	b_5	-0.716*
DFY86(2)	b_6	-0.488*
DSTA	a_6	-0.111
$\ln(PACF/PEB)$	a_7	0.352*
$(\ln(PACF/PEB))^2$	a_8	0.082*
$\ln z_1$	c_1	-0.008
$\ln z_2$	c_2	0.011
$\ln z_3$	c_3	-0.025
$\ln z_4$	c_4	0.036
$\ln z_5$	c_5	-0.029
DQTR1	d_1	0.038
DQTR2	d_2	0.092
DQTR3	d_3	-0.007
Intercept of cost share equation	θ_7	0.412*
Adjusted R^2		0.949

*statistically significant coefficient.

Table 34. MOS 13F (Fire Support Sp.), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	1.819*
$\ln y_j$	a_1	1.159*
$(\ln y_j)^2$	a_{11}	0.040*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.018
DFY86(3)	a_3	0.242
$\ln(PACF/PEB)\ln y_j$	a_4	0.063*
$\ln q$	a_5	-0.105
DFY82	b_1	-0.430*
DFY83	b_2	-0.413*
DFY84	b_3	-0.632*
DFY85	b_4	-1.094*
DFY86	b_5	-1.556*
DFY86(2)	b_6	-0.965*
DSTA	a_6	0.010
$\ln(PACF/PEB)$	a_7	0.393*
$(\ln(PACF/PEB))^2$	a_8	0.014*
$\ln z_1$	c_1	0.076
$\ln z_2$	c_2	-0.116
$\ln z_3$	c_3	-0.036
$\ln z_4$	c_4	0.010
$\ln z_5$	c_5	-0.074
$DQTR_1$	d_1	0.215*
$DQTR_2$	d_2	0.172
$DQTR_3$	d_3	0.212*
Intercept of cost share equation	g_7	0.319*
Adjusted R^2		0.917

*statistically significant coefficient.

Table 35. MOS 13M (MLRS Crewman), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	-0.054
$\ln y_j$	a_1	1.068*
$(\ln y_j)^2$	a_{11}	0.007*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.039
DFY86(3)	a_3	-0.079
$\ln(PACF/PEB)\ln y_j$	a_4	0.055*
ln q	a_5	0.025
DFY82	b_1	0.084
DFY83	b_2	-0.005
DFY84	b_3	0.338*
DFY85	b_4	0.219*
DFY86	b_5	0.198
DFY86(2)	b_6	-0.093
DSTA	a_6	0.080
ln(PACF/PEB)	a_7	-0.180*
$(\ln(PACF/PEB))^2$	a_8	-0.022*
$\ln z_1$	c_1	-0.042
$\ln z_2$	c_2	0.020
$\ln z_3$	c_3	0.008
$\ln z_4$	c_4	0.001
$\ln z_5$	c_5	0.048*
DQTR1	d_1	-0.106*
DQTR2	d_2	-0.055
DQTR3	d_3	-0.111*
Intercept of cost share equation	a_7	0.312*
Adjusted R^2		0.989

*statistically significant coefficient.

Table 36. MOS 13R (Firefinder Radar Sp.), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.492*
$\ln y_j$	a_1	1.068*
$(\ln y_j)^2$	a_{11}	0.006
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.049*
DFY86(3)	a_3	-0.057
$\ln(PACF/PEB)\ln y_j$	a_4	0.104*
$\ln q$	a_5	0.011
DFY82	b_1	0.072
DFY83	b_2	0.098
DFY84	b_3	0.263*
DFY85	b_4	0.136*
DFY86	b_5	0.159
DFY86(2)	b_6	-0.102
DSTA	a_6	0.008
$\ln(PACF/PEB)$	a_7	-0.317*
$(\ln(PACF/PEB))^2$	a_8	0.269*
$\ln z_1$	c_1	-0.009
$\ln z_2$	c_2	0.012
$\ln z_3$	c_3	-0.002
$\ln z_4$	c_4	0.004
$\ln z_5$	c_5	0.024
$DQTR_1$	d_1	-0.023
$DQTR_2$	d_2	0.041
$DQTR_3$	d_3	-0.021
Intercept of cost share equation	θ_7	0.365*
Adjusted R^2		0.991

*statistically significant coefficient.

Table 37. MOS 15E (Pershing MSL Crewman), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	-0.082
$\ln y_j$	a_1	1.072*
$(\ln y_j)^2$	a_{11}	0.002
$\ln(\sum_{k \neq j} Y_k)$	a_2	-0.014
DFY86(3)	a_3	0.327*
$\ln(PACF/PEB)\ln y_j$	a_4	0.050*
$\ln q$	a_5	0.022
DFY82	b_1	-0.054
DFY83	b_2	-0.070
DFY84	b_3	0.027
DFY85	b_4	0.085
DFY86	b_5	0.021
DFY86(2)	b_6	-0.480*
DSTA	a_6	0.337*
$\ln(PACF/PEB)$	a_7	-0.422*
$(\ln(PACF/PEB))^2$	a_8	-0.132*
$\ln z_1$	c_1	-0.014
$\ln z_2$	c_2	-0.033
$\ln z_3$	c_3	0.016
$\ln z_4$	c_4	-0.019
$\ln z_5$	c_5	0.050*
$DQTR_1$	d_1	0.037
$DQTR_2$	d_2	0.153*
$DQTR_3$	d_3	0.007
Intercept of cost share equation	θ_j	0.207*
Adjusted R^2		0.990

*statistically significant coefficient.

Table 38. MOS 15J (MLRS Lance Op. Fed. Sp.), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.407*
$\ln y_j$	a_1	1.070*
$(\ln y_j)^2$	a_{11}	0.006*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.010
DFY86(3)	a_3	0.013
$\ln(PACF/PEB)\ln y_j$	a_4	0.113*
$\ln q$	a_5	-0.003
DFY82	b_1	0.008
DFY83	b_2	0.014
DFY84	b_3	0.039
DFY85	b_4	-0.023
DFY86	b_5	0.004
DFY86(2)	b_6	-0.009
DSTA	a_6	-0.002
$\ln(PACF/PEB)$	a_7	0.113*
$(\ln(PACF/PEB))^2$	a_8	0.063*
$\ln z_1$	c_1	0.009
$\ln z_2$	c_2	-0.018
$\ln z_3$	c_3	0.001
$\ln z_4$	c_4	-0.008
$\ln z_5$	c_5	-0.005
DQTR1	d_1	0.015
DQTR2	d_2	0.017
DQTR3	d_3	0.017
Intercept of cost share equation	δ_7	0.591*
Adjusted R^2		0.998

*statistically significant equation.

Table 39. MOS 16H (Ada Op. Intel. Asst.), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	
$\ln y_j$	a_1	
$(\ln y_j)^2$	a_{11}	
$\ln(\sum_{k \neq j} y_k)$	a_2	
DFY86(3)	a_3	
$\ln(PACF/PEB)\ln y_j$	a_4	
$\ln q$	a_5	
DFY82	b_1	
DFY83	b_2	
DFY84	b_3	
DFY85	b_4	
DFY86	b_5	
DFY86(2)	b_6	
DSTA	a_6	
$\ln(PACF/PEB)$	a_7	
$(\ln(PACF/PEB))^2$	a_8	
$\ln z_1$	c_1	
$\ln z_2$	c_2	
$\ln z_3$	c_3	
$\ln z_4$	c_4	
$\ln z_5$	c_5	
DQTR1	d_1	
DQTR2	d_2	
DQTR3	d_3	
Intercept of cost share equation	θ_7	
Adjusted R^2		

*statistically significant coefficient.

Table 40. MOS 16P (ADA Short Rg. MSL Crewman), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.028
$\ln y_j$	a_1	1.077*
$(\ln y_j)^2$	a_{11}	0.006*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.023
DFY86(3)	a_3	-0.009
$\ln(PACF/PEB)\ln y_j$	a_4	0.058*
$\ln q$	a_5	-0.015
DFY82	b_1	0.020
DFY83	b_2	-0.016
DFY84	b_3	0.000
DFY85	b_4	0.037
DFY86	b_5	-0.030
DFY86(2)	b_6	-0.086
DSTA	a_6	0.097*
ln(PACF/PEB)	a_7	-0.061*
$(\ln(PACF/PEB))^2$	a_8	0.044*
$\ln z_1$	c_1	-0.016
$\ln z_2$	c_2	-0.006
$\ln z_3$	c_3	-0.003
$\ln z_4$	c_4	-0.014
$\ln z_5$	c_5	-0.003
$DQTR_1$	d_1	-0.039
$DQTR_2$	d_2	-0.013
$DQTR_3$	d_3	-0.090*
Intercept of cost share equation	θ_7	0.368*
Adjusted R^2		0.994

*statistically significant coefficient.

Table 41. MOS 16R (Ada Short Rg. Gunnery Crewman), FY81(2)-FY86(3), man-years

Variable	Parameter	Estimate
Intercept	a_0	0.225
$\ln y_j$	a_1	1.110*
$(\ln y_j)^2$	a_{11}	0.019*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.082*
DFY86(3)	a_3	-0.041*
$\ln(PACF/PEB)\ln y_j$	a_4	0.082*
$\ln q$	a_5	0.022
DFY82	b_1	0.136
DFY83	b_2	0.208*
DFY84	b_3	0.450*
DFY85	b_4	0.419*
DFY86	b_5	0.361*
DFY86(2)	b_6	-0.152*
DSTA	a_6	-0.076
$\ln(PACF/PEB)$	a_7	-0.135*
$(\ln(PACF/PEB))^2$	a_8	-0.040*
$\ln z_1$	c_1	-0.007
$\ln z_2$	c_2	0.008
$\ln z_3$	c_3	-0.009
$\ln z_4$	c_4	-0.055*
$\ln z_5$	c_5	-0.027
$DQTR_1$	d_1	-0.013
$DQTR_2$	d_2	-0.031
$DQTR_3$	d_3	0.464*
Intercept of cost share equation	7	0.986
Adjusted R^2		0.986

*statistically significant coefficient.

Table 42. MOS 16S (Manpads Crewman), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.017
$\ln y_j$	a_1	1.036*
$(\ln y_j)^2$	a_{11}	-0.002
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.018
DFY86(3)	a_3	-0.031
$\ln(PACF/PEB)\ln y_j$	a_4	0.053*
$\ln q$	a_5	-0.020
DFY82	b_1	-0.029
DFY83	b_2	0.010
DFY84	b_3	0.116
DFY85	b_4	0.025
DFY86	b_5	0.039
DFY86(2)	b_6	-0.213*
DSTA	a_6	0.076
$\ln(PACF/PEB)$	a_7	-0.310*
$(\ln(PACF/PEB))^2$	a_8	-0.055*
$\ln z_1$	c_1	-0.003
$\ln z_2$	c_2	0.015
$\ln z_3$	c_3	0.042*
$\ln z_4$	c_4	0.023
$\ln z_5$	c_5	0.023
$DQTR_1$	d_1	0.030
$DQTR_2$	d_2	0.015
$DQTR_3$	d_3	-0.022
Intercept of coost share equation	7	0.273*
Adjusted R^2		0.991

*statistically significant coefficient.

Table 43. MOS 16X (Air Defense), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	-0.663
$\ln y_j$	a_1	1.061*
$(\ln y_j)^2$	a_{11}	0.006*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.012
DFY86(3)	a_3	-0.343*
$\ln(PACF/PEB)\ln y_j$	a_4	0.057*
$\ln q$	a_5	0.095
DFY82	b_1	0.139
DFY83	b_2	0.228*
DFY84	b_3	0.756*
DFY85	b_4	0.779*
DFY86	b_5	0.505*
DFY86(2)	b_6	-0.412*
DSTA	a_6	0.244
$\ln(PACF/PEB)$	a_7	0.438*
$(\ln(PACF/PEB))^2$	a_8	0.068*
$\ln z_1$	c_1	-0.083
$\ln z_2$	c_2	0.012
$\ln z_3$	c_3	0.061
$\ln z_4$	c_4	-0.037
$\ln z_5$	c_5	0.061*
$DQTR_1$	d_1	-0.022*
$DQTR_2$	d_2	0.020
$DQTR_3$	d_3	-0.030
Intercept of cost share equation	θ_7	0.416*
Adjusted R^2		0.976

*statistically significant coefficient.

Table 44. MOS 19E (Armor Crewman), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.321
$\ln y_j$	a_1	1.035*
$(\ln y_j)^2$	a_{11}	-0.001
$\ln(\sum_{k \neq j} Y_k)$	a_2	0.080*
DFY86(3)	a_3	-0.616*
$\ln(\text{PACF/PEB}) \ln y_j$	a_4	-0.051*
$\ln q$	a_5	-0.020
DFY82	b_1	-0.089
DFY83	b_2	-0.016
DFY84	b_3	0.119
DFY85	b_4	-0.222
DFY86	b_5	0.152
DFY86(2)	b_6	-0.546*
DSTA	a_6	-0.021
ln(PACF/PEB)	a_7	-0.047
$(\ln(\text{PACF/PEB}))^2$	a_8	0.009*
$\ln z_1$	c_1	0.031
$\ln z_2$	c_2	-0.063
$\ln z_3$	c_3	0.005
$\ln z_4$	c_4	-0.028
$\ln z_5$	c_5	-0.006
DQTR_1	d_1	0.008
DQTR_2	d_2	-0.007
DQTR_3	d_3	0.045
Intercept of cost share equation	θ_7	0.337*
Adjusted R^2		0.947

*statistically significant coefficient.

Table 45. MOS 19D (Cavalry Scout), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	-0.014
$\ln y_j$	a_1	1.046*
$(\ln y_j)^2$	a_{11}	0.001
$\ln(\sum_{k \neq j} y_k)$	a_2	0.004
DFY86(3)	a_3	-0.024
$\ln(PACF/PEB)\ln y_j$	a_4	0.044*
$\ln q$	a_5	-0.002
DFY82	b_1	-0.010
DFY83	b_2	-0.007
DFY84	b_3	-0.015
DFY85	b_4	-0.012
DFY86	b_5	0.017
DFY86(2)	b_6	-0.027*
DSTA	a_6	-0.015*
$\ln(PACF/PEB)$	a_7	-0.686*
$(\ln(PACF/PEB))^2$	a_8	-0.097*
$\ln z_1$	c_1	0.003
$\ln z_2$	c_2	-0.002
$\ln z_3$	c_3	0.000
$\ln z_4$	c_4	0.003
$\ln z_5$	c_5	-0.006*
$DQTR_1$	d_1	-0.000
$DQTR_2$	d_2	-0.001
$DQTR_3$	d_3	0.001
Intercept of cost share equation	θ_7	0.179*
Adjusted R^2		0.999

*statistically significant coefficient.

Table 46.0 MOS 19K (Armor Crewman M1 Tank), FY81(2)-FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.646*
$\ln y_j$	a_1	1.109*
$(\ln y_j)^2$	a_{11}	0.013*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.005
DFY86(3)	a_3	-0.859*
$\ln(PACF/PEB) \ln y_j$	a_4	-0.052*
$\ln q$	a_5	-0.027
DFY82	b_1	-0.026
DFY83	b_2	0.102
DFY84	b_3	-0.054
DFY85	b_4	-0.039
DFY86	b_5	-0.077
DFY86(2)	b_6	-0.870*
DSTA	a_6	-0.013
$\ln(PACF/PEB)$	a_7	0.238*
$(\ln(PACF/PEB))^2$	a_8	0.022*
$\ln z_1$	c_1	0.027
$\ln z_2$	c_2	-0.015
$\ln z_3$	c_3	-0.017
$\ln z_4$	c_4	-0.023
$\ln z_5$	c_5	-0.051*
$DQTR_1$	d_1	-0.035
$DQTR_2$	d_2	-0.010
$DQTR_3$	d_3	0.038*
Intercept of cost share equation	θ_7	0.330*
Adjusted R^2		0.986

*statistically significant coefficient.

Table 47. (All Non-Combat Arms MOSs), FY86(3) man-years

Variable	Parameter	Estimate
Intercept	a_0	0.624*
$\ln y_j$	a_1	1.081*
$(\ln y_j)^2$	a_{11}	-0.006*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.001
DFY86(3)	a_3	-0.877*
$\ln(PACF/PEB)\ln y_j$	a_4	0.035*
ln q	a_5	-0.045*
DFY82	b_1	-0.196*
DFY83	b_2	-0.242*
DFY84	b_3	-0.062*
DFY85	b_4	0.048*
DFY86	b_5	-0.013
DFY86(2)	b_6	-0.620*
DSTA	a_6	0
ln(PACF/PEB)	a_7	0.368*
$(\ln(PACF/PEB))^2$	a_8	0.085*
$\ln z_1$	c_1	0.043*
$\ln z_2$	c_2	-0.051*
$\ln z_3$	c_3	0.014*
$\ln z_4$	c_4	0.002
$\ln z_5$	c_5	-0.002
$DQTR_1$	d_1	0.040*
$DQTR_2$	d_2	0.045*
$DQTR_3$	d_3	0.014
Intercept of cost share equation	θ_7	0.459*
Adjusted R^2		0.978

*statistically significant coefficient.

Table 48. Validation results, new incentive prices
FY81(2)-FY86(3) contracts

	Incentive Cost ($M)		ACF Share (%)		
MOS	Observed	Estimated	Observed	Estimated	Efficient
11X	269.38	335.52	35	35	41
12B	25.56	26.23	46	46	100
19K	14.28	13.89	24	24	100
All other non-Combat Arms MOSs	500.90	469.35	59	59	66

inefficient) cost share was 40 percent, the efficient ACF cost share should be about 41 percent.

If GSA active duty man-years is the driving determinant, then the efficient ACF cost share for delivering the 165,217 active duty man-years is 14 percentage points less, at 27 percent. This is because when one uses man-years, the intercept of the cost share equation is 0.448 whereas the coefficient of ln(PACF/PEB) is 0.316. Hence, the efficient ACF cost share (when active duty man-years is the determining factor) is 0.446-0.316, which is about 13 percentage points lower than the actual share, or about 27 percent. Thus, as expected, moving to man-years markedly reduces the reliance on the ACF mechanism. This is because the ratio of the respective prices \$2,954/\$5,605 = 0.527 (i.e, ratio of the ACF cost per contract to the EB cost per contract), is lower than the 832/1,414 = 0.588 (ratio of the ACF cost per GSA man-year to the EB cost per man-year).

That is, on a contract basis, the relative prices favor more usage of the ACF mechanism than is the case for the man-year criterion.

The same type of result occurs for the catchall MOS, consisting of all non-Combat Arms MOSs. Again referring to table 1, for this important grouping, 249,206 GSA contracts were obtained over the 22 quarters at a cost of about \$591.28M, with about 65 percent being spent on the ACF. For this MOS grouping, the average price for the ACF benefit was \$2,907 versus \$3,959 for the value of the EB benefit. The efficient ACF allocation, <u>based on GSA contracts</u>, would have been about 66 percent.

Now consider what happens when one focuses instead on active duty man-years. The actual active duty GSA man-years contracted for was 859,761, an average of 3.45 man-years of active duty per contract. The actual average cost of a <u>man-year</u> was \$921 and \$990 for the ACF and the EB mechanism,

respectively. Hence, the respective prices are much closer when evaluated on the basis of a man-year. Thus, one would expect the efficient cost share for the ACF to go down if the allocation is driven by man-years (as compared to contracts). The efficient ACF cost share is actually 9 percentage points less, at 56 percent for man-years. Therefore, we see that, in general, focusing on GSA man-years rather than GSA contracts tends to increase the utilization of EBs because, everything else being equal, the relative prices per man-year are much more equal for the two mechanisms than are the relative prices per GSA contract, where the ACF mechanism generally has an advantage.

Table 49 summarizes the remarks of the above discussions.

4.0 EXCURSION ON THE IMPACT ON OPTIMAL ALLOCATIONS OF CHANGE IN THE ACTUARIAL COST ESTIMATE OF ACF INCENTIVES

Using the information provided in Section 1.2C as the background for this excursion, let us see what the impact would be on optimal allocations when there is a change in the actuarial cost estimate of the ACF incentives.

Consider MOS 11X, where almost $293M was expended on 43,501 GSA contracts over 22 quarters (see table 1). Of this amount, 40 percent was the actual share spent on the ACF (using DOD established prices of $2,659, $3,326, and $3,329 as the amount to be deposited in an escrow account for each 2-, 3-, and 4-year ACF incentive, respectively). Recall too, that based on these prices, the efficient cost share for the ACF was about 41 percent. Now consider what happens when the price vectors for the 2-, 3-, and 4-year ACF benefits are assumed to be $1,700, $2,565, and $2,735, respectively. Then, <u>assuming the same utilization</u> of the incentives, the total cost would fall to $269M, a reduction of $23M. Also, the observed cost share for the ACF would be 34.9 percent, down from 40 percent. Upon estimating the incentive cost

Table 49. Impact on optimal allocations if requirements are expressed in GSA active duty man-years (by MOS) instead of GSA contracts

	Av. ACF cost per contract when used	Av. EB cost per contract when used	Av. ACF cost per man-year when used	AV. EB cost per man-year when used
MOS 11X	$2,954	$5605	$832	$1,414
All non-Combat Arms MOSs	$2,907	$3,959	$921	$ 990

	Actual cost (In FY87 dollars)	No. of GSA contracts	No. of GSA active duty man-years	Actual % on ACF	Eff. % on ACF using contracts	Eff. % on ACF using man-years
MOS 11X	$292.96M	43,501	165,217	40	41	27
All non-Combat Arms MOSs	$591.28M	249,206	859,761	65	66	56

<u>General Conclusion</u>: If GSA active duty man-years are used (rather than GSA contracts), a 10-14 percentile drop occurs in the efficient allocation of the ACF mechanism.

allocation model, the efficient ACF cost share should be 41 percent (i.e., 6 points higher than it would have been at the lower costs). Hence, as expected, lowering the assumed ACF prices results in lower total costs and in a large increase in the number of units of the ACF benefit that would be awarded. Thus, under the DOD benchmark cost structure, the weighted average ACF cost for MOS 11X was $2,954. Because the efficient cost share was 41 percent, and the total cost was almost $293M, we arrive at some 40,500 applications of the ACF. Under the new cost structure, on the other hand, the weighted cost for the ACF would be $1,889 and the total cost $269M; the number of applications of the ACF would be about 58,000. All coefficients are essentially unchanged except those for the ln(PACF/PEB) and the intercept in the cost share equation, ass shown below in table 50:

Table 50. Changes in regression coefficients for MOS 11X when ACF actuarial cost estimates are lowered

Coefficient Estimates	Benchmark ACF Cost Scenario	Lowered ACF Cost Scenario
α_7	0.488	0.527
θ_7	0.476	0.455

Now consider the results for the catchall grouping of all non-Combat Arms MOSs. Recall that over 22 quarters the actual cost, using the DOD benchmark ACF costs, was $591M, the observed ACF cost share was 64.9 percent, and the efficient ACF cost share was 65.9 percent. If the actuarial ACF cost estimates were lowered, the total cost would fall to $500.8M, a reduction of about $91M. Further, under this cost structure, the observed fraction of

expenditures for the ACF would be 59 percent but the efficient ACF cost share would be 66 percent. Once again, only two parameters are changed, as shown in table 51 below:

Table 51. Changes in regression coefficients for all non-Combat Arms MOSs when ACF actuarial cost estimates are lowered

Coefficient Estimate	Benchmark ACF Cost Scenario	Lowered ACF Cost Scenario
α_7	0.394	0.40
θ_7	0.389	0.33

In conclusion, the optimal allocation model performs as expected when the actuarial ACF cost estimates are varied. Although the total cost decreases the efficient number of applications of the ACF mechanism increases markedly (for MOS 11X, from 40,000 applications over 22 quarters to 58,000 applications).

See tables 52-72 for details, and table 73 for some summaries.

5.0 ANALYSIS OF EXPERIENCE SINCE DELINKAGE

5.1 Background

As discussed in Section 1, the Army's incentive program underwent two major changes in CY86z: (1) the ACF and EB benefits were decoupled or delinked so that recruits could receive only one or the other; and (2) the guidance counselor reforms instituted in April 1986, whereby guidance counselors were given incentives to "sell" critical MOSs. These impacts were captured in the 22 quarter model (of Sections 2, 3, and 4) through the use of special regression dummies for the appropriate quarters. Indeed, in Section 2, we computed a reduction in cost of about 27 percent that could have been achieved

Table 52. MOS 11X (Infantry): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.897*
$\ln y_j$	a_1	1.036*
$(\ln y_j)^2$	a_{11}	-0.007*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.059*
DFY86(3)	a_3	-0.219*
$\ln(PACF/PEB)\ln y_j$	a_4	0.019*
$\ln q$	a_5	-0.025
DFY82	b_1	-0.013
DFY83	b_2	0.094*
DFY84	b_3	0.043
DFY85	b_4	-0.187*
DFY86	b_5	0.160*
DFY86(2)	b_6	-0.307*
DSTA	a_6	0
$\ln(PACF/PEB)$	a_7	0.527*
$(\ln(PACF/PEB))^2$	a_8	0.106*
$\ln z_1$	c_1	0.005
$\ln z_2$	c_2	-0.070*
$\ln z_3$	c_3	0.016
$\ln z_4$	c_4	-0.001
$\ln z_5$	c_5	-0.002
$DQTR_1$	d_1	0.076*
$DQTR_2$	d_2	0.115*
$DQTR_3$	d_3	0.111*
Intercept for cost share equation	[illegible]7	0.465*
Adjusted R^2		0.913

*-statistically significant coefficient.

Table 53. MOS 12B (Combat Engineer): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	1.169
$\ln y_j$	a_1	1.113*
$(\ln y_j)^2$	a_{11}	0.030*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.127
DFY86(3)	a_3	-0.466
$\ln(PACF/PEB)\ln y_j$	a_4	0.061*
$\ln q$	a_5	-0.146
DFY82	b_1	0.104
DFY83	b_2	-0.067
DFY84	b_3	-0.107
DFY85	b_4	-0.129
DFY86	b_5	-0.343
DFY86(2)	b_6	-0.520*
DSTA	a_6	0.770
$\ln(PACF/PEB)$	a_7	1.414*
$(\ln(PACF/PEB))^2$	a_8	0.018
$\ln z_1$	c_1	0.250*
$\ln z_2$	c_2	-0.267*
$\ln z_3$	c_3	0.061
$\ln z_4$	c_4	0.003
$\ln z_5$	c_5	0.013
$DQTR_1$	d_1	0.200
$DQTR_2$	d_2	0.280*
$DQTR_3$	d_3	0.194*
Intercept for cost share equation	α_7	0.425*
Adjusted R^2		0.802

*=statistically significant coefficient.

Table 54. MOS 12C (Bridge Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	-1.365
$\ln y_j$	a_1	1.269*
$(\ln y_j)^2$	a_{11}	0.080*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.008
DFY86(3)	a_3	-0.349
$\ln(PACF/PEB)\ln y_j$	a_4	0.127*
$\ln q$	a_5	0.040
DFY82	b_1	0.758*
DFY83	b_2	1.045*
DFY84	b_3	0.983*
DFY85	b_4	1.769*
DFY86	b_5	2.277*
DFY86(2)	b_6	-0.099
DSTA	a_6	-0.247
$\ln(PACF/PEB)$	a_7	0.563*
$(\ln(PACF/PEB))^2$	a_8	-0.309*
$\ln z_1$	c_1	0.001
$\ln z_2$	c_2	-0.017
$\ln z_3$	c_3	0.249*
$\ln z_4$	c_4	0.068
$\ln z_5$	c_5	-0.083
$DQTR_1$	d_1	-0.258*
$DQTR_2$	d_2	-0.434*
$DQTR_3$	d_3	-0.049
Intercept for cost share equation	γ_7	0.407*
Adjusted R^2		0.801

*=statistically significant coefficient.

Table 55. MOS 12F (Engr. Truck Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.315
$\ln y_j$	a_1	1.503*
$(\ln y_j)^2$	a_{11}	0.118*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.009
DFY86(3)	a_3	-0.177
$\ln(PACF/PEB)\ln y_j$	a_4	0.136*
$\ln q$	a_5	0.018
DFY82	b_1	-0.009
DFY83	b_2	-0.029
DFY84	b_3	0.154
DFY85	b_4	0.320
DFY86	b_5	0.330
DFY86(2)	b_6	-0.440*
DSTA	a_6	0.177
$\ln(PACF/PEB)$	a_7	1.262*
$(\ln(PACF/PEB))^2$	a_8	-0.197*
$\ln z_1$	c_1	-0.005
$\ln z_2$	c_2	-0.116
$\ln z_3$	c_3	-0.119
$\ln z_4$	c_4	0.066
$\ln z_5$	c_5	0.023
$DQTR_1$	d_1	0.011
$DQTR_2$	d_2	0.089
$DQTR_3$	d_3	0.077
Intercept for cost share equation	θ_7	0.693*
Adjusted R^2		0.826

*=statistically significant coefficient.

Table 56. MOS 13B (Cannon Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	1.138
$\ln y_j$	a_1	1.045*
$(\ln y_j)^2$	a_{11}	0.041*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.196*
DFY86(3)	a_3	0.089
$\ln(PACF/PEB)\ln y_j$	a_4	0.018*
$\ln q$	a_5	-0.021
DFY82	b_1	-0.349*
DFY83	b_2	-0.375*
DFY84	b_3	-0.303
DFY85	b_4	-0.610*
DFY86	b_5	-0.867*
DFY86(2)	b_6	-0.432*
DSTA	a_6	0.237
$\ln(PACF/PEB)$	a_7	1.067*
$(\ln(PACF/PEB))^2$	a_8	-0.055*
$\ln z_1$	c_1	0.049
$\ln z_2$	c_2	-0.195*
$\ln z_3$	c_3	0.023
$\ln z_4$	c_4	-0.212*
$\ln z_5$	c_5	0.069
DQTR1	d_1	0.232*
DQTR2	d_2	0.070
DQTR3	d_3	-0.066
Intercept for cost share equation	c_7	0.187*
Adjusted R^2		0.708

*=statistically significant coefficient.

Table 57. MOS 13C (Tacfire Opns. Sp.): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.221
$\ln y_j$	a_1	1.416*
$(\ln y_j)^2$	a_{11}	0.085*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.016
DFY86(3)	a_3	-0.098
$\ln(PACF/PEB) \ln y_j$	a_4	0.121*
$\ln q$	a_5	0.013
DFY82	b_1	0.038
DFY83	b_2	0.157
DFY84	b_3	0.252
DFY85	b_4	0.182
DFY86	b_5	0.032
DFY86(2)	b_6	-0.304
DSTA	a_6	-0.080
$\ln(PACF/PEB)$	a_7	1.292*
$(\ln(PACF/PEB))^2$	a_8	-0.314*
$\ln z_1$	c_1	0.152
$\ln z_2$	c_2	0.018
$\ln z_3$	c_3	0.007
$\ln z_4$	c_4	-0.111
$\ln z_5$	c_5	0.044
$DQTR_1$	d_1	0.182*
$DQTR_2$	d_2	0.140
$DQTR_3$	d_3	0.172*
Intercept for cost share equation	θ_7	0.545*
Adjusted R^2		0.880

*=statistically significant coefficient.

Table 58. MOS 13E (Cannon Fire Sp.): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.712
$\ln y_j$	a_1	1.159*
$(\ln y_j)^2$	a_{11}	0.033*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.013
DFY86(3)	a_3	0.282
$\ln(PACF/PEB)\ln y_j$	a_4	0.060*
$\ln q$	a_5	-0.009
DFY82	b_1	-0.047
DFY83	b_2	-0.075
DFY84	b_3	-0.198
DFY85	b_4	-0.282
DFY86	b_5	-0.995*
DFY86(2)	b_6	-0.127
DSTA	a_6	-0.020
$\ln(PACF/PEB)$	a_7	0.184*
$(\ln(PACF/PEB))^2$	a_8	-0.069*
$\ln z_1$	c_1	0.030
$\ln z_2$	c_2	-0.000
$\ln z_3$	c_3	0.015
$\ln z_4$	c_4	-0.087
$\ln z_5$	c_5	0.016
$DQTR_1$	d_1	0.228
$DQTR_2$	d_2	0.251*
$DQTR_3$	d_3	0.043
Intercept for cost share equation	θ_7	0.230*
Adjusted R^2		0.861

*=statistically significant coefficient.

Table 59. MOS 13F (Fire Support Sp.): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	3.885*
$\ln y_j$	a_1	1.268*
$(\ln y_j)^2$	a_{11}	0.102*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.520*
DFY86(3)	a_3	0.347
$\ln(PACF/PEB)\ln y_j$	a_4	0.049*
$\ln q$	a_5	-0.251
DFY82	b_1	-1.108*
DFY83	b_2	-0.695*
DFY84	b_3	-2.397*
DFY85	b_4	-5.100*
DFY86	b_5	-3.678*
DFY86(2)	b_6	-0.801
DSTA	a_6	0.003
$\ln(PACF/PEB)$	a_7	2.682*
$(\ln(PACF/PEB))^2$	a_8	-0.042*
$\ln z_1$	c_1	0.150
$\ln z_2$	c_2	-0.363*
$\ln z_3$	c_3	0.014
$\ln z_4$	c_4	-0.276
$\ln z_5$	c_5	-0.084
$DQTR_1$	d_1	1.146*
$DQTR_2$	d_2	0.891*
$DQTR_3$	d_3	1.080*
Intercept for cost share equation	θ_7	0.282*
Adjusted R^2		0.599

*=statistically significant coefficient.

Table 60. MOS 13M (MLRS Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	1.562*
$\ln y_j$	a_1	1.430*
$(\ln y_j)^2$	a_{11}	0.098*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.056
DFY86(3)	a_3	0.282
$\ln(PACF/PEB)\ln y_j$	a_4	0.067*
$\ln q$	a_5	-0.108
DFY82	b_1	-0.065
DFY83	b_2	-0.248
DFY84	b_3	0.120
DFY85	b_4	0.315
DFY86	b_5	-0.325
DFY86(2)	b_6	0.499
DSTA	a_6	0.271
$\ln(PACF/PEB)$	a_7	1.488*
$(\ln(PACF/PEB))^2$	a_8	-0.438*
$\ln z_1$	c_1	0.056
$\ln z_2$	c_2	-0.119
$\ln z_3$	c_3	0.070
$\ln z_4$	c_4	-0.059
$\ln z_5$	c_5	0.024
DQTR1	d_1	-0.085
DQTR2	d_2	-0.201*
DQTR3	d_3	-0.305*
Intercept for cost share equation	θ_7	-0.204*
Adjusted R^2		0.862

*=statistically significant coefficient.

Table 61. WOS 13R (Firefinder Radat Sp.): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.969
$\ln y_j$	a_1	1.378*
$(\ln y_j)^2$	a_{11}	0.091*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.023
DFY86(3)	a_3	-0.081
$\ln(PACF/PEB)\ln y_j$	a_4	0.110*
$\ln q$	a_5	-0.060
DFY82	b_1	-0.055
DFY83	b_2	-0.610*
DFY84	b_3	-0.010
DFY85	b_4	-0.093
DFY86	b_5	-0.187
DFY86(2)	b_6	-0.106
DSTA	a_6	0.640
$\ln(PACF/PEB)$	a_7	1.442*
$(\ln(PACF/PEB))^2$	a_8	-0.291*
$\ln z_1$	c_1	-0.009
$\ln z_2$	c_2	-0.130
$\ln z_3$	c_3	0.034
$\ln z_4$	c_4	-0.165
$\ln z_5$	c_5	0.029
$DQTR_1$	d_1	0.094
$DQTR_2$	d_2	0.161
$DQTR_3$	d_3	0.142
Intercept for cost share equation	θ_7	0.493*
Adjusted R^2		0.801

*=statistically significant coefficient.

Table 62. MOS 15E (Pershing MSL Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.574
$\ln y_j$	a_1	1.193*
$(\ln y_j)^2$	a_{11}	0.041*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.068
DFY86(3)	a_3	-0.263
$\ln(PACF/PEB) \ln y_j$	a_4	0.059*
$\ln q$	a_5	-0.006
DFY82	b_1	0.458*
DFY83	b_2	0.708*
DFY84	b_3	0.425*
DFY85	b_4	0.397
DFY86	b_5	0.013
DFY86(2)	b_6	-0.472*
DSTA	a_6	0.043
$\ln(PACF/PEB)$	a_7	1.303*
$(\ln(PACF/PEB))^2$	a_8	-0.120*
$\ln z_1$	c_1	-0.063
$\ln z_2$	c_2	-0.003
$\ln z_3$	c_3	-0.008
$\ln z_4$	c_4	-0.167
$\ln z_5$	c_5	0.020
DQTR1	d_1	-0.037
DQTR2	d_2	0.106
DQTR3	d_3	-0.094
Intercept for cost share equation	θ_7	0.170*
Adjusted R^2		0.901

*=statistically significant coefficient.

Table 63. MOS 15J (MLRS Lance Op. Fed. Sp.): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.386
$\ln y_j$	a_1	1.548*
$(\ln y_j)^2$	a_{11}	0.116*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.140
DFY86(3)	a_3	0.047
$\ln(PACF/PEB) \ln y_j$	a_4	0.127*
$\ln q$	a_5	-0.026
DFY82	b_1	0.216
DFY83	b_2	0.074
DFY84	b_3	0.195
DFY85	b_4	-0.103
DFY86	b_5	0.157
DFY86(2)	b_6	0.153
DSTA	a_6	-0.098
$\ln(PACF/PEB)$	a_7	1.553*
$(\ln(PACF/PEB))^2$	a_8	-0.154*
$\ln z_1$	c_1	0.055
$\ln z_2$	c_2	-0.128
$\ln z_3$	c_3	-0.017
$\ln z_4$	c_4	-0.020
$\ln z_5$	c_5	-0.013
$DQTR_1$	d_1	0.051
$DQTR_2$	d_2	0.030
$DQTR_3$	d_3	0.070
Intercept for cost share equation	δ_7	0.586*
Adjusted R^2		0.854

*=statistically significant coefficient.

Table 64. MOS 16H (Ada Op. Intel. Asst.): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	
$\ln y_j$	a_1	
$(\ln y_j)^2$	a_{11}	
$\ln(\sum_{k \neq j} y_k)$	a_2	
DFY86(3)	a_3	
$\ln(PACF/PEB)\ln y_j$	a_4	
$\ln q$	a_5	
DFY82	b_1	
DFY83	b_2	
DFY84	b_3	
DFY85	b_4	
DFY86	b_5	
DFY86(2)	b_6	
DSTA	a_6	
$\ln(PACF/PEB)$	a_7	
$(\ln(PACF/PEB))^2$	a_8	
$\ln z_1$	c_1	
$\ln z_2$	c_2	
$\ln z_3$	c_3	
$\ln z_4$	c_4	
$\ln z_5$	c_5	
$DQTR_1$	d_1	
$DQTR_2$	d_2	
$DQTR_3$	d_3	
Intercept for cost share equation	θ_7	
Adjusted R^2		

*=statistically significant coefficient.

Table 65. MOS 16P (Ada Short Rg. MSL Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	-0.609
$\ln y_j$	a_1	1.486*
$(\ln y_j)^2$	a_{11}	0.165*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.392*
DFY86(3)	a_3	-0.302
$\ln(PACF/PEB)\ln y_j$	a_4	0.055*
$\ln q$	a_5	-0.151
DFY82	b_1	-0.018
DFY83	b_2	-0.437
DFY84	b_3	1.709*
DFY85	b_4	1.803*
DFY86	b_5	2.112*
DFY86(2)	b_6	-0.555
DSTA	a_6	1.215*
$\ln(PACF/PEB)$	a_7	1.600*
$(\ln(PACF/PEB))^2$	a_8	-0.192*
$\ln z_1$	c_1	0.040
$\ln z_2$	c_2	0.057
$\ln z_3$	c_3	0.002
$\ln z_4$	c_4	-0.122
$\ln z_5$	c_5	-0.054
$DQTR_1$	d_1	-0.405*
$DQTR_2$	d_2	-0.370*
$DQTR_3$	d_3	-0.645*
Intercept for cost share equation	θ_7	-0.004
Adjusted R^2		0.742

*=statistically significant coefficient.

Table 66. MOS 16R (Ada Short Rg. Gunnery Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.239
$\ln y_j$	a_1	1.335*
$(\ln y_j)^2$	a_{11}	0.090*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.139
DFY86(3)	a_3	-0.940*
$\ln(PACF/PEB)\ln y_j$	a_4	0.096*
ln q	a_5	0.124
DFY82	b_1	1.099*
DFY83	b_2	1.329*
DFY84	b_3	2.467*
DFY85	b_4	2.433*
DFY86	b_5	2.544*
DFY86(2)	b_6	-0.715*
DSTA	a_6	0.074
ln(PACF/PEB)	a_7	0.954*
$(\ln(PACF/PEB))^2$	a_8	-0.022*
$\ln z_1$	c_1	-0.181
$\ln z_2$	c_2	-0.033
$\ln z_3$	c_3	0.064
$\ln z_4$	c_4	0.007
$\ln z_5$	c_5	0.025
$DQTR_1$	d_1	-0.612*
$DQTR_2$	d_2	-0.448*
$DQTR_3$	d_3	-0.493*
Intercept of cost share equation	δ_7	0.156*
Adjusted R^2		0.825

*=statistically significant coefficient.

Table 67. MOS 16S (Manpads Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.120
$\ln y_j$	a_1	1.610*
$(\ln y_j)^2$	a_{11}	0.178*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.241
DFY86(3)	a_3	-1.007*
$\ln(PACF/PEB)\ln y_j$	a_4	0.056*
$\ln q$	a_5	-0.013
DFY82	b_1	0.074
DFY83	b_2	0.620*
DFY84	b_3	2.545*
DFY85	b_4	2.791*
DFY86	b_5	2.907*
DFY86(2)	b_6	-1.211*
DSTA	a_6	0.054
$\ln(PACF/PEB)$	a_7	1.902*
$(\ln(PACF/PEB))^2$	a_8	-0.255*
$\ln z_1$	c_1	-0.154
$\ln z_2$	c_2	0.071
$\ln z_3$	c_3	0.101
$\ln z_4$	c_4	0.133
$\ln z_5$	c_5	0.107
$DQTR_1$	d_1	-0.393*
$DQTR_2$	d_2	-0.140
$DQTR_3$	d_3	-0.305*
Intercept for cost share equation	θ_7	-0.072*
Adjusted R^2		0.739

*=statistically significant coefficient.

Table 68. MOS 16X (Air Defense): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	-1.636
$\ln y_j$	a_1	1.205*
$(\ln y_j)^2$	a_{11}	0.072*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.002
DFY86(3)	a_3	-0.293
$\ln(PACF/PEB)\ln y_j$	a_4	0.058*
$\ln q$	a_5	0.122
DFY82	b_1	1.546*
DFY83	b_2	1.958*
DFY84	b_3	3.107*
DFY85	b_4	3.297*
DFY86	b_5	2.873*
DFY86(2)	b_6	-0.712
DSTA	a_6	0.548*
$\ln(PACF/PEB)$	a_7	2.200*
$(\ln(PACF/PEB))^2$	a_8	0.416*
$\ln z_1$	c_1	-0.194
$\ln z_2$	c_2	0.015
$\ln z_3$	c_3	-0.139
$\ln z_4$	c_4	-0.272
$\ln z_5$	c_5	0.170*
$DQTR_1$	d_1	0.142*
$DQTR_2$	d_2	0.197
$DQTR_3$	d_3	0.170
Intercept for cost share equation	θ_7	0.981*
Adjusted R^2		0.778

*=statistically significant coefficient.

Table 69. MOS 19E (Armor Crewman): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	0.150
$\ln y_j$	a_1	1.096*
$(\ln y_j)^2$	a_{11}	-0.028*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.087
DFY86(3)	a_3	-0.236*
$\ln(PACF/PEB)\ln y_j$	a_4	0.046*
$\ln q$	a_5	0.008
DFY82	b_1	0.135
DFY83	b_2	0.029
DFY84	b_3	-0.356
DFY85	b_4	-0.298
DFY86	b_5	-0.730*
DFY86(2)	b_6	-0.457
DSTA	a_6	0.221
$\ln(PACF/PEB)$	a_7	1.028*
$(\ln(PACF/PEB))^2$	a_8	-0.032
$\ln z_1$	c_1	0.095
$\ln z_2$	c_2	-0.035
$\ln z_3$	c_3	-0.044
$\ln z_4$	c_4	-0.041
$\ln z_5$	c_5	-0.088
$DQTR_1$	d_1	0.419*
$DQTR_2$	d_2	0.341*
$DQTR_3$	d_3	0.255*
Intercept for cost share equation	δ_7	0.322*
Adjusted R^2		0.744

*=statistically significant coefficient.

Table 70. MOS 19D (Cavalry Scout): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	-0.401*
$\ln y_j$	a_1	1.237*
$(\ln y_j)^2$	a_{11}	0.039*
$\ln(\sum_{k \neq j} y_k)$	a_2	-0.006
DFY86(3)	a_3	0.115
$\ln(PACF/PEB)\ln y_j$	a_4	0.054*
$\ln q$	a_5	0.008
DFY82	b_1	0.003
DFY83	b_2	0.004
DFY84	b_3	0.015
DFY85	b_4	0.025
DFY86	b_5	-0.079
DFY86(2)	b_6	0.078
DSTA	a_6	0.016
$\ln(PACF/PEB)$	a_7	-0.705*
$(\ln(PACF/PEB))^2$	a_8	-0.248*
$\ln z_1$	c_1	-0.016
$\ln z_2$	c_2	0.016
$\ln z_3$	c_3	0.003
$\ln z_4$	c_4	0.014
$\ln z_5$	c_5	-0.004*
$DQTR_1$	d_1	-0.007
$DQTR_2$	d_2	0.002
$DQTR_3$	d_3	-0.007
Intercept for cost share equation	θ_7	-0.003
Adjusted R^2		0.963

*=statistically significant coefficient.

Table 71. MOS 19K (Armor Crewman M1 Tank): new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	1.631
$\ln y_j$	a_1	1.327*
$(\ln y_j)^2$	a_{11}	0.073*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.156
DFY86(3)	a_3	-1.674*
$\ln(PACF/PEB)\ln y_j$	a_4	-0.053*
$\ln q$	a_5	-0.037
DFY82	b_1	0.191
DFY83	b_2	0.564*
DFY84	b_3	0.214
DFY85	b_4	-0.527*
DFY86	b_5	0.460
DFY86(2)	b_6	-1.545*
DSTA	a_6	-0.445*
$\ln(PACF/PEB)$	a_7	1.128*
$(\ln(PACF/PEB))^2$	a_8	-0.021
$\ln z_1$	c_1	0.092
$\ln z_2$	c_2	-0.133
$\ln z_3$	c_3	-0.029
$\ln z_4$	c_4	-0.132
$\ln z_5$	c_5	-0.151*
$DQTR_1$	d_1	-0.461*
$DQTR_2$	d_2	-0.165
$DQTR_3$	d_3	0.016
Intercept for cost share equation	θ_7	0.279*
Adjusted R^2		0.861

*=statistically significant coefficient.

Table 72. All non-Combat Arms MOSs: new incentive prices, FY81(2)-FY86(3) contracts

Variable	Parameter	Estimate
Intercept	a_0	-2.869*
$\ln y_j$	a_1	2.104*
$(\ln y_j)^2$	a_{11}	-0.098*
$\ln(\sum_{k \neq j} y_k)$	a_2	0.091*
DFY86(3)	a_3	-0.428*
$\ln(PACF/PEB)\ln y_j$	a_4	0.055*
$\ln q$	a_5	-0.066*
DFY82	b_1	-0.670*
DFY83	b_2	0.827*
DFY84	b_3	1.172*
DFY85	b_4	1.214*
DFY86	b_5	0.863*
DFY86(2)	b_6	-0.288*
DSTA	a_6	0
$\ln(PACF/PEB)$	a_7	0.406*
$(\ln(PACF/PEB))^2$	a_8	0.031*
$\ln z_1$	c_1	-0.024
$\ln z_2$	c_2	-0.086*
$\ln z_3$	c_3	0.038*
$\ln z_4$	c_4	-0.011
$\ln z_5$	c_5	-0.071*
$DQTR_1$	d_1	0.130*
$DQTR_2$	d_2	0.111*
$DQTR_3$	d_3	0.190*
Intercept for cost share equation	θ_7	0.334*
Adjusted R^2		0.816

*=statistically significant coefficient.

Table 73. Impact on optimal allocations of reduced ACF actuarial costs per taker (using GSA contracts for requirements)

Facts	2-year ACF	3-year ACF	4-year ACF
DOD current escrow amounts	$2,659	$3,326	$3,329
Proposed amounts	$1,700	$2,565	$2,735

MOS 11X

	Under Current Prices	Under Proposed Prices
Actual cost	$ 292M	$ 269M
Av. ACF cost per taker	$2,954	$1,889
Actual ACF cost share	40%	34.9%
Efficient ACF cost share	41%	41%
App. number of ACF takers	40,500	58,000

prior to delinkage if the experience due to the delinkage policy and the guidance counselor reforms had been in effect. This is to be compared with the 40 percent reduction observed (i.e., from $3,364 for 22 quarters to $2,005 for CY86) in the average incentive cost per GSA contract (see table 2). However, what we do not know is the effect these reforms may have had on the Army's ability to perform redistributions and build the market.

5.2 Results of Regressions

To try to gain some insights into this issue, we performed some regression analyses using only data since delinkage. Unfortunately, the availability of only four quarters of data (for 54 battalions) does not allow us to capture seasonal effects and the impact of guidance counselor reforms. In addition, because some MOSs had very few contracts over this period of time, many of our quarterly battalion cells had no contracts and hence no incentive cost. Other shortcomings for this brief four quarter period include no data on current Army advertising and no data on military/civilian pay ratios. Hence, we have much more confidence in the results from the 22 quarters, which include both pre- and post-delinkage experience.

The regression results for the 21 MOS groupings are shown in tables 74-94 for contracts and tables 95-115 for man-years. To compare pre- and post-delinkage results table 116 shows for the non-Combat Arms grouping of MOSs, the differences in the efficient cost shares based on contracts and on man-years. For example, if the requirements are in terms of GSA contracts, the efficient cost share would go from 65 percent pre-delinkage to 88 percent post-delinkage.

In conclusion, we feel that more experience with delinkage will improve the allocation technique and help determine the trade-offs between nonmonetary and monetary incentives.

Table 74. MOS 11X (Infantry), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-0.639
$\ln y_j$	a_1	1.547*
$(\ln y_j)^2$	α_{11}	-0.080*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.022
DFY86(3)	α_3	-0.118*
$\ln(PACF/PEB)\ln y_j$	α_4	0.012
$\ln(PACF/PEB)$	α_7	-0.333*
$(\ln(PACF/PEB))^2$	α_8	0.300*
$\ln z_1$	c_1	0.084*
$\ln z_2$	c_2	-0.003
$\ln z_3$	c_3	-0.041*
$\ln z_4$	c_4	-0.004
$\ln z_5$	c_5	-0.106*
Intercept for cost share equation	θ_7	0.531*
Adjusted R^2		0.784

*=statistically significant coefficient.

Table 75. MOS 12B (Combat Engineer), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	2.112*
$\ln y_j$	a_1	1.064*
$(\ln y_j)^2$	α_{11}	0.013
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.106
DFY86(3)	α_3	-0.362*
$\ln(PACF/PEB)\ln y_j$	α_4	0.069*
$\ln(PACF/PEB)$	α_7	0.694*
$(\ln(PACF/PEB))^2$	α_8	0.033
$\ln z_1$	c_1	0.075*
$\ln z_2$	c_2	-0.180
$\ln z_3$	c_3	-0.049
$\ln z_4$	c_4	0.146
$\ln z_5$	c_5	-0.034
Intercept for cost share equation	θ_7	0.569*
Adjusted R^2		0.802

*=statistically significant coefficient.

Table 76. MOS 12C (Bridge Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-3.408
$\ln y_j$	a_1	0.883*
$(\ln y_j)^2$	α_{11}	-0.003
$\ln(\sum_{k \neq j} y_k)$	α_2	0.151
DFY86(3)	α_3	0.092
$\ln(PACF/PEB)\ln y_j$	α_4	0.076
$\ln(PACF/PEB)$	α_7	-0.107
$(\ln(PACF/PEB))^2$	α_8	-0.312
$\ln z_1$	c_1	-0.025
$\ln z_2$	c_2	0.324
$\ln z_3$	c_3	0.129
$\ln z_4$	c_4	0.967
$\ln z_5$	c_5	-0.196*
Intercept for cost share equation	θ_7	0.340*
Adjusted R^2		0.802

*=statistically significant coefficient.

Table 77. MOS 12F (Engr. Truck Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	0.700
$\ln y_j$	a_1	1.710*
$(\ln y_j)^2$	α_{11}	0.171*
$\ln(\sum_{k \neq j} y_k)$	α_2	0.216
DFY86(3)	α_3	0.082
$\ln(PACF/PEB)\ln y_j$	α_4	0.128*
$\ln(PACF/PEB)$	α_7	1.615
$(\ln(PACF/PEB))^2$	α_8	-0.461*
$\ln z_1$	c_1	0.192*
$\ln z_2$	c_2	-0.465*
$\ln z_3$	c_3	-0.190*
$\ln z_4$	c_4	-0.280
$\ln z_5$	c_5	0.139
Intercept for cost share equation	θ_7	0.984*
Adjusted R^2		0.733

*=statistically significant coefficient.

Table 78. MOS 13B (Cannon Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	0.451
$\ln y_j$	a_1	1.024*
$(\ln y_j)^2$	α_{11}	0.001
$\ln(\sum_{k \neq j} y_k)$	α_2	0.024
DFY86(3)	α_3	-0.236*
$\ln(PACF/PEB)\ln y_j$	α_4	-0.039
$\ln(PACF/PEB)$	α_7	0.110
$(\ln(PACF/PEB))^2$	α_8	-0.275*
$\ln z_1$	c_1	0.125*
$\ln z_2$	c_2	-0.092
$\ln z_3$	c_3	-0.062
$\ln z_4$	c_4	-0.441
$\ln z_5$	c_5	-0.088
Intercept for cst share equation	θ_7	0.256*
Adjusted R^2		0.756

*-statistically significant coefficient.

Table 79. MOS 13C (Tacfire Opns. Sp.), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-1.284
$\ln y_j$	a_1	1.230*
$(\ln y_j)^2$	α_{11}	0.060*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.077
DFY86(3)	α_3	0.115
$\ln(PACF/PEB)\ln y_j$	α_4	0.154*
$\ln(PACF/PEB)$	α_7	4.227
$(\ln(PACF/PEB))^2$	α_8	-1.368*
$\ln z_1$	c_1	-0.019
$\ln z_2$	c_2	0.001
$\ln z_3$	c_3	0.040
$\ln z_4$	c_4	-0.757*
$\ln z_5$	c_5	-0.107
Intercept for cost share equation	θ_7	2.101*
Adjusted R^2		0.882

*-statistically significant coefficient.

Table 80. MOS 13E (Cannon Fire Sp.), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-2.667
$\ln y_j$	a_1	1.323*
$(\ln y_j)^2$	α_{11}	0.092*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.474
DFY86(3)	α_3	-0.073
$\ln(PACF/PEB)\ln y_j$	α_4	0.140*
$\ln(PACF/PEB)$	α_7	0.003
$(\ln(PACF/PEB))^2$	α_8	0.075
$\ln z_1$	c_1	0.024
$\ln z_2$	c_2	0.543
$\ln z_3$	c_3	-0.068
$\ln z_4$	c_4	0.295
$\ln z_5$	c_5	-0.145
Intercept for cost share equation	θ_7	0.584*
Adjusted R^2		0.785

*=statistically significant coefficient.

Table 81. MOS 13F (Fire Support Sp.), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-1.964
$\ln y_j$	a_1	1.255*
$(\ln y_j)^2$	α_{11}	0.086*
$\ln(\sum_{k \neq j} y_k)$	α_2	0.096
DFY86(3)	α_3	0.757*
$\ln(PACF/PEB)\ln y_j$	α_4	0.117*
$\ln(PACF/PEB)$	α_7	0.909
$(\ln(PACF/PEB))^2$	α_8	-0.039
$\ln z_1$	c_1	0.035
$\ln z_2$	c_2	0.026
$\ln z_3$	c_3	-0.055
$\ln z_4$	c_4	-0.198
$\ln z_5$	c_5	-0.042
Intercept for cost share equation	θ_7	0.412*
Adjusted R^2		0.621

*=statistically significant coefficient.

Table 82. MOS 13M (MLRS Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-0.732
$\ln y_j$	a_1	0.792*
$(\ln y_j)^2$	α_{11}	-0.030
$\ln(\sum_{k \neq j} y_k)$	α_2	0.208
DFY86(3)	α_3	-0.223
$\ln(PACF/PEB)\ln y_j$	α_4	0.093*
$\ln(PACF/PEB)$	α_7	1.957*
$(\ln(PACF/PEB))^2$	α_8	-0.390*
$\ln z_1$	c_1	-0.010
$\ln z_2$	c_2	-0.013
$\ln z_3$	c_3	-0.000
$\ln z_4$	c_4	-0.640*
$\ln z_5$	c_5	-0.057
Intercept for cost share equation	θ_7	0.347*
Adjusted R^2		0.915

*=statistically significant coefficient.

Table 83. MOS 13R (Firefinder Radar Sp.), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-4.681*
$\ln y_j$	a_1	1.303*
$(\ln y_j)^2$	α_{11}	0.099
$\ln(\sum_{k \neq j} y_k)$	α_2	0.129
DFY86(3)	α_3	-0.267
$\ln(PACF/PEB)\ln y_j$	α_4	0.122*
$\ln(PACF/PEB)$	α_7	8.267*
$(\ln(PACF/PEB))^2$	α_8	-0.615*
$\ln z_1$	c_1	0.014
$\ln z_2$	c_2	0.004
$\ln z_3$	c_3	-0.032
$\ln z_4$	c_4	-0.519
$\ln z_5$	c_5	-0.034
Intercept for cost share equation	θ_7	1.146*
Adjusted R^2		0.699

*=statistically significant coefficient.

Table 84. MOS 15E (Pershing MSL Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-0.149
$\ln y_j$	a_1	1.366*
$(\ln y_j)^2$	α_{11}	0.092*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.369
DFY86(3)	α_3	-0.406
$\ln(PACF/PEB)\ln y_j$	α_4	0.129*
$\ln(PACF/PEB)$	α_7	-0.505
$(\ln(PACF/PEB))^2$	α_8	-1.239*
$\ln z_1$	c_1	-0.076
$\ln z_2$	c_2	0.203
$\ln z_3$	c_3	0.031
$\ln z_4$	c_4	0.051
$\ln z_5$	c_5	0.027
Intercept for cost share equation	θ_7	-0.068*
Adjusted R^2		0.755

*=statistically significant coefficient.

Table 85. MOS 15J (MLRS Lance Op. Fed. Sp.), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	
$\ln y_j$	a_1	
$(\ln y_j)^2$	α_{11}	
$\ln(\sum_{k \neq j} y_k)$	α_2	
DFY86(3)	α_3	
$\ln(PACF/PEB)\ln y_j$	α_4	
$\ln(PACF/PEB)$	α_7	
$(\ln(PACF/PEB))^2$	α_8	
$\ln z_1$	c_1	
$\ln z_2$	c_2	
$\ln z_3$	c_3	
$\ln z_4$	c_4	
$\ln z_5$	c_5	
Intercept for cost share equation	θ_7	
Adjusted R^2		

*=statistically significant coefficient.

Table 86. MOS 16H (Ada Op. Intel. Asst.), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	0.175
$\ln y_j$	a_1	1.016*
$(\ln y_j)^2$	α_{11}	0.006
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.117
DFY86(3)	α_3	0.220*
$\ln(PACF/PEB)\ln y_j$	α_4	0.160*
$\ln(PACF/PEB)$	α_7	0.361
$(\ln(PACF/PEB))^2$	α_8	0.075
$\ln z_1$	c_1	-0.006
$\ln z_2$	c_2	0.112
$\ln z_3$	c_3	-0.015
$\ln z_4$	c_4	0.314
$\ln z_5$	c_5	-0.045
Intercept for cost share equation	θ_7	0.760*
Adjusted R^2		0.970

*=statistically significant coefficient.

Table 87. MOS 16P (Ada Short Rg. MSL Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	2.332
$\ln y_j$	a_1	1.164*
$(\ln y_j)^2$	α_{11}	0.059
$\ln(\sum_{k \neq j} y_k)$	α_2	0.002
DFY86(3)	α_3	0.150
$\ln(PACF/PEB)\ln y_j$	α_4	-0.010
$\ln(PACF/PEB)$	α_7	0.133
$(\ln(PACF/PEB))^2$	α_8	-2.090*
$\ln z_1$	c_1	0.052
$\ln z_2$	c_2	-0.290
$\ln z_3$	c_3	-0.034
$\ln z_4$	c_4	-0.563
$\ln z_5$	c_5	-0.070
Intercept for cost share equation	θ_7	-1.789*
Adjusted R^2		0.857

*=statistically significant coefficient.

Table 88. MOS 16R (Ada Short Rg. Gunnery Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-1.843
$\ln y_j$	a_1	1.139*
$(\ln y_j)^2$	α_{11}	0.033
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.099
DFY86(3)	α_3	-0.261
$\ln(PACF/PEB)\ln y_j$	α_4	0.111*
$\ln(PACF/PEB)$	α_7	-0.549
$(\ln(PACF/PEB))^2$	α_8	-0.511*
$\ln z_1$	c_1	-0.084
$\ln z_2$	c_2	0.247
$\ln z_3$	c_3	0.036
$\ln z_4$	c_4	0.368
$\ln z_5$	c_5	0.045
Intercept for cost share equation	θ_7	0.268*
Adjusted R^2		0.890

*=statistically significant coefficient.

Table 89. MOS 16S (Manpads Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-0.037
$\ln y_j$	a_1	1.161*
$(\ln y_j)^2$	α_{11}	0.049*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.281
DFY86(3)	α_3	-0.008
$\ln(PACF/PEB)\ln y_j$	α_4	0.122*
$\ln(PACF/PEB)$	α_7	1.408*
$(\ln(PACF/PEB))^2$	α_8	-0.835*
$\ln z_1$	c_1	0.032
$\ln z_2$	c_2	0.184
$\ln z_3$	c_3	-0.038
$\ln z_4$	c_4	-0.210
$\ln z_5$	c_5	-0.083
Intercept for cost share equation	θ_7	-0.072*
Adjusted R^2		0.848

*=statistically significant coefficient.

Table 90. MOS 16X (Air Defense), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	0.871
$\ln y_j$	a_1	1.153*
$(\ln y_j)^2$	α_{11}	0.053*
$\ln(\sum_{k \neq j} y_k)$	α_2	0.961*
DFY86(3)	α_3	0.387
$\ln(PACF/PEB)\ln y_j$	α_4	0.161*
$\ln(PACF/PEB)$	α_7	0.776*
$(\ln(PACF/PEB))^2$	α_8	-0.922*
$\ln z_1$	c_1	0.042
$\ln z_2$	c_2	-0.607*
$\ln z_3$	c_3	-0.206*
$\ln z_4$	c_4	-0.448
$\ln z_5$	c_5	-0.251
Intercept for cost share equation	θ_7	-0.049
Adjusted R^2		0.789

*=statistically significant coefficient.

Table 91. MOS 19E (Armor Crewman), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-0.908
$\ln y_j$	a_1	1.102*
$(\ln y_j)^2$	α_{11}	0.054*
$\ln(\sum_{k \neq j} y_k)$	α_2	0.345
DFY86(3)	α_3	-0.213
$\ln(PACF/PEB)\ln y_j$	α_4	0.041
$\ln(PACF/PEB)$	α_7	1.118*
$(\ln(PACF/PEB))^2$	α_8	0.317
$\ln z_1$	c_1	0.087
$\ln z_2$	c_2	-0.134
$\ln z_3$	c_3	-0.065
$\ln z_4$	c_4	-0.448
$\ln z_5$	c_5	-0.167
Intercept for cost share equation	θ_7	0.661*
Adjusted R^2		0.616

*=statistically significant coefficient.

Table 92. MOS 19D (Cavalry Scout), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	0.431
$\ln y_j$	a_1	1.150*
$(\ln y_j)^2$	α_{11}	0.045*
$\ln(\sum_{k \neq j} y_k)$	α_2	0.313
DFY86(3)	α_3	-0.001
$\ln(PACF/PEB)\ln y_j$	α_4	0.062*
$\ln(PACF/PEB)$	α_7	1.040
$(\ln(PACF/PEB))^2$	α_8	-0.718*
$\ln z_1$	c_1	0.058
$\ln z_2$	c_2	-0.247
$\ln z_3$	c_3	-0.005
$\ln z_4$	c_4	-0.299
$\ln z_5$	c_5	-0.140
Intercept for cost share equation	θ_7	0.073
Adjusted R^2		0.897

*=statistically significant coefficient.

Table 93. MOS 19K (Armor Crewman MI Tank), CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	1.051
$\ln y_j$	a_1	1.126*
$(\ln y_j)^2$	α_{11}	0.038*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.186
DFY86(3)	α_3	-0.488*
$\ln(PACF/PEB)\ln y_j$	α_4	0.115*
$\ln(PACF/PEB)$	α_7	0.780*
$(\ln(PACF/PEB))^2$	α_8	-0.260
$\ln z_1$	c_1	0.067
$\ln z_2$	c_2	0.004
$\ln z_3$	c_3	-0.068
$\ln z_4$	c_4	0.090
$\ln z_5$	c_5	-0.099
Intercept for cost share equation	θ_7	0.189
Adjusted R^2		0.661

*=statistically significant coefficient.

Table 94. All non-Combat Arms MOSs, CY86 contracts

Variable	Parameter	Estimate
Intercept	α_0	-7.913
$\ln y_j$	a_1	3.606*
$(\ln y_j)^2$	α_{11}	-0.225
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.075
DFY86(3)	α_3	-0.210*
$\ln(PACF/PEB)\ln y_j$	α_4	-0.023
$\ln(PACF/PEB)$	α_7	0.884*
$(\ln(PACF/PEB))^2$	α_8	0.114*
$\ln z_1$	c_1	0.064*
$\ln z_2$	c_2	0.037
$\ln z_3$	c_3	-0.043*
$\ln z_4$	c_4	-0.132
$\ln z_5$	c_5	-0.118*
Intercept for cost share equation	θ_7	0.875*
Adjusted R^2		0.646

*=statistically significant coefficient.

Table 95. MOS 11X (Infantry), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	0.240
$\ln y_j$	a_1	1.118*
$(\ln y_j)^2$	α_{11}	-0.011
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.053*
DFY86(3)	α_3	-0.054*
$\ln(PACF/PEB)\ln y_j$	α_4	-0.038
$\ln(PACF/PEB)$	α_7	0.046
$(\ln(PACF/PEB))^2$	α_8	0.095*
$\ln z_1$	c_1	0.012
$\ln z_2$	c_2	0.006
$\ln z_3$	c_3	-0.007
$\ln z_4$	c_4	0.057
$\ln z_5$	c_5	-0.006
Intercept for cost share eq ation	θ_7	0.637*
Adjusted R^2		0.947

*=statistically significant coefficient.

Table 96. MOS 12B (Combat Engineer), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	3.736*
$\ln y_j$	a_1	1.135*
$(\ln y_j)^2$	α_{11}	0.030*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.216
DFY86(3)	α_3	-0.152
$\ln(\text{PACF/PEB}) \ln y_j$	α_4	0.050*
ln(PACF/PEB)	α_7	0.264*
$(\ln(\text{PACF/PEB}))^2$	α_8	0.137*
$\ln z_1$	c_1	0.012
$\ln z_2$	c_2	-0.381*
$\ln z_3$	c_3	0.012
$\ln z_4$	c_4	-0.032
$\ln z_5$	c_5	0.175*
Intercept for cost share equation	θ_7	0.407*
Adjusted R^2		0.750

*=statistically significant coefficient.

Table 97. MOS 12C (Bridge Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-0.381
$\ln y_j$	a_1	0.997*
$(\ln y_j)^2$	α_{11}	-0.003
$\ln(\sum_{k \neq j} y_k)$	α_2	0.022
DFY86(3)	α_3	0.028
$\ln(PACF/PEB)\ln y_j$	α_4	0.049
$\ln(PACF/PEB)$	α_7	0.292*
$(\ln(PACF/PEB))^2$	α_8	-0.394*
$\ln z_1$	c_1	0.002
$\ln z_2$	c_2	0.039
$\ln z_3$	c_3	-0.002
$\ln z_4$	c_4	-0.015
$\ln z_5$	c_5	-0.016
Intercept for cost share equation	θ_7	0.625*
Adjusted R^2		0.995

*=statistically significant coefficient.

Table 98. MOS 12F (Engr. Truck Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-0.089
$\ln y_j$	a_1	1.086*
$(\ln y_j)^2$	α_{11}	0.025
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.002
DFY86(3)	α_3	0.240*
$\ln(PACF/PEB)\ln y_j$	α_4	0.136*
$\ln(PACF/PEB)$	α_7	0.273
$(\ln(PACF/PEB))^2$	α_8	-0.189
$\ln z_1$	c_1	0.031
$\ln z_2$	c_2	-0.002
$\ln z_3$	c_3	-0.050
$\ln z_4$	c_4	-0.085
$\ln z_5$	c_5	0.010
Intercept for cost share equation	θ_7	1.013*
Adjusted R^2		0.972

*=statistically significant coefficient.

Table 99. MOS 13B (Cannon Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	0.124
$\ln y_j$	a_1	0.995*
$(\ln y_j)^2$	α_{11}	-0.011*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.066
DFY86(3)	α_3	-0.142*
$\ln(PACF/PEB)\ln y_j$	α_4	-0.012
$\ln(PACF/PEB)$	α_7	-0.105
$(\ln(PACF/PEB))^2$	α_8	-0.020
$\ln z_1$	c_1	0.037*
$\ln z_2$	c_2	0.009
$\ln z_3$	c_3	-0.022
$\ln z_4$	c_4	-0.040
$\ln z_5$	c_5	-0.094*
Intercept for cost share equation	θ_7	0.300*
Adjusted R^2		0.959

*=statistically significant coefficient.

Table 100. MOS 13C (Tacfire Opns. Sp.), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-0.016
$\ln y_j$	a_1	0.964*
$(\ln y_j)^2$	α_{11}	-0.010*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.013
DFY86(3)	α_3	0.014
$\ln(PACF/PEB)\ln y_j$	α_4	0.126*
$\ln(PACF/PEB)$	α_7	1.164*
$(\ln(PACF/PEB))^2$	α_8	-0.468*
$\ln z_1$	c_1	-0.002
$\ln z_2$	c_2	0.006
$\ln z_3$	c_3	0.000
$\ln z_4$	c_4	-0.019
$\ln z_5$	c_5	0.000
Intercept for cost share equation	θ_7	1.357*
Adjusted R^2		0.999

*=statistically significant coefficient.

Table 101. MOS 13E (Cannon Fire Sp.), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-1.561
$\ln y_j$	a_1	1.069*
$(\ln y_j)^2$	α_{11}	0.028*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.074
DFY86(3)	α_3	0.335
$\ln(PACF/PEB)\ln y_j$	α_4	0.083*
$\ln(PACF/PEB)$	α_7	0.205
$(\ln(PACF/PEB))^2$	α_8	0.196
$\ln z_1$	c_1	-0.058
$\ln z_2$	c_2	0.227
$\ln z_3$	c_3	0.040
$\ln z_4$	c_4	0.482
$\ln z_5$	c_5	-0.067
Intercept for cost share equation	θ_7	0.312
Adjusted R^2		0.917

*=statistically significant coefficient.

Table 102. MOS 13F (Fire Support Sp.), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-2.329
$\ln y_j$	a_1	1.169*
$(\ln y_j)^2$	α_{11}	0.059*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.054
DFY86(3)	α_3	1.203*
$\ln(PACF/PEB)\ln y_j$	α_4	0.068*
$\ln(PACF/PEB)$	α_7	0.571
$(\ln(PACF/PEB))^2$	α_8	-0.210
$\ln z_1$	c_1	-0.021
$\ln z_2$	c_2	0.167
$\ln z_3$	c_3	-0.034
$\ln z_4$	c_4	0.185
$\ln z_5$	c_5	-0.065
Intercept for cost share equation	θ_7	0.453*
Adjusted R^2		0.802

*-statistically significant coefficient.

Table 103. MOS 13M (MLRS Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	0.396
$\ln y_j$	a_1	1.024*
$(\ln y_j)^2$	α_{11}	0.010
$\ln(\sum_{k \neq j} y_k)$	α_2	0.061
DFY86(3)	α_3	-0.001
$\ln(PACF/PEB)\ln y_j$	α_4	0.051*
$\ln(PACF/PEB)$	α_7	0.533*
$(\ln(PACF/PEB))^2$	α_8	0.053
$\ln z_1$	c_1	-0.006
$\ln z_2$	c_2	-0.108
$\ln z_3$	c_3	0.010
$\ln z_4$	c_4	-0.008
$\ln z_5$	c_5	0.046
Intercept for cost share equation	θ_7	0.373*
Adjusted R^2		0.980

*=statistically significant coefficient.

Table 104. MOS 13R (Tacfire Radar Sp.), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-1.277*
$\ln y_j$	a_1	1.068*
$(\ln y_j)^2$	α_{11}	0.021
$\ln(\sum_{k \neq j} y_k)$	α_2	0.051
DFY86(3)	α_3	-0.011
$\ln(PACF/PEB)\ln y_j$	α_4	0.114*
$\ln(PACF/PEB)$	α_7	1.606*
$(\ln(PACF/PEB))^2$	α_8	-0.439*
$\ln z_1$	c_1	-0.010
$\ln z_2$	c_2	0.033
$\ln z_3$	c_3	-0.005
$\ln z_4$	c_4	0.068
$\ln z_5$	c_5	0.022
Intercept for cost share equation	θ_7	1.210*
Adjusted R^2		0.982

*=statistically significant coefficient.

Table 105. MOS 15E (Pershing MSL Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	1.139
$\ln y_j$	a_1	0.981*
$(\ln y_j)^2$	α_{11}	0.001
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.209
DFY86(3)	α_3	0.157
$\ln(PACF/PEB)\ln y_j$	α_4	0.108*
$\ln(PACF/PEB)$	α_7	1.005*
$(\ln(PACF/PEB))^2$	α_8	-0.465*
$\ln z_1$	c_1	0.025
$\ln z_2$	c_2	-0.043
$\ln z_3$	c_3	-0.011
$\ln z_4$	c_4	0.234
$\ln z_5$	c_5	0.091
Intercept for cost share equation	θ_7	0.650*
Adjusted R^2		0.952

*=statistically significant coefficient.

Table 106. MOS 15J (MLRS Lance Op. Fed. Sp.), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	
$\ln y_j$	a_1	
$(\ln y_j)^2$	α_{11}	
$\ln(\sum_{k \neq j} y_k)$	α_2	
DFY86(3)	α_3	
$\ln(PACF/PEB)\ln y_j$	α_4	
$\ln(PACF/PEB)$	α_7	
$(\ln(PACF/PEB))^2$	α_8	
$\ln z_1$	c_1	
$\ln z_2$	c_2	
$\ln z_3$	c_3	
$\ln z_4$	c_4	
$\ln z_5$	c_5	
Intercept for cost share equation	θ_7	
Adjusted R^2		

*=statistically significant coefficient.

Table 107. MOS 16H (Ada Op. Intel. Asst.), CY86, man-years

Variable	Parameter	Estimate
Intercept	α_0	-0.007
$\ln y_j$	a_1	1.004*
$(\ln y_j)^2$	α_{11}	0.001*
$\ln(\sum_{k \neq j} y_k)$	α_2	0.000
DFY86(3)	α_3	-0.000
$\ln(PACF/PEB)\ln y_j$	α_4	0.148*
$\ln(PACF/PEB)$	α_7	0.848*
$(\ln(PACF/PEB))^2$	α_8	0.552*
$\ln z_1$	c_1	0.000
$\ln z_2$	c_2	-0.000
$\ln z_3$	c_3	-0.000
$\ln z_4$	c_4	0.001
$\ln z_5$	c_5	0.001
Intercept for cost share equation	θ_7	0.858*
Adjusted R^2		0.999

*=statistically significant coefficient.

Table 108. MOS 16P (Ada Short Rg. MSL Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	0.711
$\ln y_j$	a_1	1.185*
$(\ln y_j)^2$	α_{11}	0.042*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.076
DFY86(3)	α_3	0.013
$\ln(PACF/PEB)\ln y_j$	α_4	-0.099
$\ln(PACF/PEB)$	α_7	-1.126*
$(\ln(PACF/PEB))^2$	α_8	-0.254
$\ln z_1$	c_1	0.006
$\ln z_2$	c_2	-0.022
$\ln z_3$	c_3	-0.008
$\ln z_4$	c_4	-0.057
$\ln z_5$	c_5	-0.074
Intercept for cost share equation	θ_7	-0.413
Adjusted R^2		0.966

*=statistically significant coefficient.

Table 5.36 MOS 16R (Ada Short Rg. Gunnery Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	0.080
$\ln y_j$	a_1	1.069*
$(\ln y_j)^2$	α_{11}	0.009
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.123
DFY86(3)	α_3	-0.207*
$\ln(PACF/PEB)\ln y_j$	α_4	0.100*
$\ln(PACF/PEB)$	α_7	-0.824*
$(\ln(PACF/PEB))^2$	α_8	-0.534*
$\ln z_1$	c_1	-0.031
$\ln z_2$	c_2	0.041
$\ln z_3$	c_3	0.023
$\ln z_4$	c_4	0.206
$\ln z_5$	c_5	0.157*
Intercept for cost share equation	θ_7	0.531*
Adjusted R^2		0.977

*=statistically significant coefficient.

Table 110. MOS 16S (Manpads Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-0.251
$\ln y_j$	a_1	0.914*
$(\ln y_j)^2$	α_{11}	-0.019*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.056
DFY86(3)	α_3	0.087
$\ln(PACF/PEB)\ln y_j$	α_4	0.136*
$\ln(PACF/PEB)$	α_7	0.407*
$(\ln(PACF/PEB))^2$	α_8	-0.272*
$\ln z_1$	c_1	0.002
$\ln z_2$	c_2	0.088*
$\ln z_3$	c_3	0.001
$\ln z_4$	c_4	0.032
$\ln z_5$	c_5	-0.039
Intercept for cost share equation	θ_7	0.468*
Adjusted R^2		0.995

*=statistically significant coefficient.

Table 111. MOS 16X (Air Defense), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-0.672
$\ln y_j$	a_1	1.013*
$(\ln y_j)^2$	α_{11}	0.008
$\ln(\sum_{k \neq j} y_k)$	α_2	0.178
DFY86(3)	α_3	0.188
$\ln(PACF/PEB)\ln y_j$	α_4	0.097*
$\ln(PACF/PEB)$	α_7	0.341*
$(\ln(PACF/PEB))^2$	α_8	-0.314*
$\ln z_1$	c_1	-0.024
$\ln z_2$	c_2	-0.065
$\ln z_3$	c_3	0.052
$\ln z_4$	c_4	0.009
$\ln z_5$	c_5	-0.009
Intercept for cost share equation	θ_7	0.345*
Adjusted R^2		0.966

*=statistically significant coefficient.

Table 112. MOS 19E (Armor Crewman), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	-1.127
$\ln y_j$	a_1	0.732*
$(\ln y_j)^2$	α_{11}	0.028
$\ln(\sum_{k \neq j} y_k)$	α_2	1.457*
DFY86(3)	α_3	0.350
$\ln(PACF/PEB)\ln y_j$	α_4	0.063*
$\ln(PACF/PEB)$	α_7	0.969
$(\ln(PACF/PEB))^2$	α_8	-0.114
$\ln z_1$	c_1	0.101
$\ln z_2$	c_2	-0.835
$\ln z_3$	c_3	-0.099
$\ln z_4$	c_4	1.892
$\ln z_5$	c_5	0.157
Intercept for cost share equation	θ_7	0.556*
Adjusted R^2		0.180

*=statistically significant coefficient.

Table 113. MOS 19D (Cavalry Scout), CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	0.251*
$\ln y_j$	a_1	1.000*
$(\ln y_j)^2$	α_{11}	-0.002*
$\ln(\sum_{k \neq j} y_k)$	α_2	0.003
DFY86(3)	α_3	0.007
$\ln(PACF/PEB) \ln y_j$	α_4	0.033*
ln(PACF/PEB)	α_7	-0.296*
$(\ln(PACF/PEB))^2$	α_8	0.426*
$\ln z_1$	c_1	0.000
$\ln z_2$	c_2	-0.008
$\ln z_3$	c_3	-0.000
$\ln z_4$	c_4	0.017
$\ln z_5$	c_5	-0.019*
Intercept for cost share equation	θ_7	0.077*
Adjusted R^2		0.999

*=statistically significant coefficient.

Table 114. MOS 19K (Armor Crewman) CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	0.706
$\ln y_j$	a_1	1.114*
$(\ln y_j)^2$	α_{11}	0.044*
$\ln(\sum_{k \neq j} y_k)$	α_2	-0.162
DFY86(3)	α_3	0.266
$\ln(PACF/PEB)\ln y_j$	α_4	0.191*
$\ln(PACF/PEB)$	α_7	0.401*
$(\ln(PACF/PEB))^2$	α_8	-0.176*
$\ln z_1$	c_1	0.046
$\ln z_2$	c_2	0.049
$\ln z_3$	c_3	-0.083
$\ln z_4$	c_4	0.399
$\ln z_5$	c_5	-0.237*
Intercept for cost share equation	θ_7	0.100
Adjusted R^2		0.774

*=statistically significant coefficient.

Table 115. All non-Combat Arms MOSs, CY86 man-years

Variable	Parameter	Estimate
Intercept	α_0	0.041
$\ln y_j$	a_1	0.978*
$(\ln y_j)^2$	α_{11}	0.002
$\ln(\sum_{k \neq j} y_k)$	α_2	0.008
DFY86(3)	α_3	-0.035*
$\ln(PACF/PEB)\ln y_j$	α_4	-0.081*
$\ln(PACF/PEB)$	α_7	1.183*
$(\ln(PACF/PEB))^2$	α_8	0.034*
$\ln z_1$	c_1	-0.004
$\ln z_2$	c_2	-0.003
$\ln z_3$	c_3	0.003
$\ln z_4$	c_4	-0.020
$\ln z_5$	c_5	0.003
Intercept for cost share equation	β_7	1.206*
Adjusted R^2		0.984

*-statistically significant coefficient.

Table 116. Comparison of pre- and post-delinkage allocation recommendations for all non-Combat Arms MOSs

	Based on first 22 quarters	Based on four quarters since delinkage
Number of GSA contracts	249,206	52,781
Actual dollars spent	$591.28M	$82.296M
Actual cost per GSA contract	$ 2,373	$ 1,559
Actual percent spent on ACF	65%	76.7%
Efficient ACF share (based on contracts)	65%	88%
Efficient ACF share (based on man-years)	56%	74%
$ Savings	$193.94M[a]	$34.9M[b]

[a]From delinkage and guidance counselor reforms.

[b]From eliminating further inefficiencies associated with allocation and technical inefficiencies.

Table 117. Validation results, CY86 Contracts

	Incentive Cost ($M)			ACF Share (%)		
MOS	Observed	Estimated	Efficient	Observed	Estimated	Efficient
11X	29.70	29.26	19.02	51	51	0
12B	4.06	3.92	0.70	69	69	82
12C	0.66	0.55	0.16	29	29	0
12F	0.19	0.12	0.06	23	23	86
13B	9.74	9.71	3.72	25	25	11
13C	0.23	0.21	0.13	22	22	100
13E	0.98	0.97	0.37	33	33	0
13F	1.40	1.27	0.55	35	35	85
13M	0.51	0.48	0.17	38	38	100
13R	0.15	0.08	0.07	17	17	100
15E	0.68	0.59	0.26	30	30	0
15J						
16H	0.46	0.45	0.25	39	39	0
16P	0.32	0.27	0.21	0	0	100
16R	0.64	0.59	0.22	33	33	0
16S	0.66	0.61	0.31	21	21	100
16X	0.88	0.88	0.21	18	18	100
19E	3.30	3.25	0.67	61	61	100
19D	0.93	0.90	0.25	17	17	100
19K	3.38	3.19	0.93	40	40	99
All	82.80	81.27	34.86	77	77	78
Others						
Total	141.67	138.57	63.45			

☆U.S. GOVERNMENT PRINTING OFFICE: 1988 -643-167/89002